

**MASTER:**  
**Multiple Auditory Steady-state Response  
System**

**User's and Service manual**

**590-MASTER, Rev. D**

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## Introduction

The Multiple Auditory Steady-state Response System (MASTER) is a Windows®-based data acquisition system that assesses human hearing by recording auditory steady-state responses. The system generates multiple amplitude-modulated auditory stimuli, frequency-modulated auditory stimuli, or both. Simultaneously, it acquires electrophysiological responses to these stimuli, displays these responses in the frequency-domain, and determines whether or not the responses are significantly larger than background electroencephalographic activity. Operators can print the results, store the data on storage media, and review the stored data.

The system design follows clear principles concerning the generation of acoustic signals, the acquisition of artifact-free data, the analysis of electrophysiological responses in the frequency-domain, and the objective detection of signals in noise. The MASTER system combines and presents several tones to test subjects simultaneously. It then assesses those tones and lets technicians measure responses to several stimuli in the time it usually takes to measure one.

The MASTER System includes both software and hardware and requires a Personal Computer running Windows '98, 2000, or XP to collect and analyze auditory steady-state responses. Bio-logic's Navigator®Pro Unit performs the A/D, D/A functions required by the test. These functions include producing the stimulus output (to Headphones, Inserts, Inserts with Ear Muffs®, and Bone Conduction Oscillator) and gathering the EEG input from the patient's electrodes. The Navigator® Pro connects to the PC's serial port and communicates using the RS232 communication protocol.

Clinicians and audiologists use this system to assess hearing in patients who require objective audiometry and to facilitate research with auditory steady-state responses. Electrophysiological responses to sounds are useful when patients are unable or unwilling to give accurate or reliable behavioral responses. Clinical, medical, or educational facilities where auditory evaluations take place are excellent venues for this system.

This product is capable of delivering very high intensity stimuli to the patient's ear. These can damage hearing if used improperly. Therefore, it is intended for use only by trained professionals who understand how to administer the test safely.



## System Requirements



### WARNING

Equipment that supports this program must be designed to meet all applicable medical equipment standards for patient isolation and electrical safety. Bio-logic Systems Corp assumes no responsibility for the equipment into which this program is installed, or for errors and omissions made during the installation process. It is the installer's responsibility to insure the finished system meets appropriate equipment standards, such as IEC 60601, BS 5724, and UL2601.



### CAUTION

This system is intended for use as a medical instrument only. The software installed on this system has been verified and validated for that use as long as no other unintended or unauthorized software is running at the same time. Do not install, download, save, or transfer other programs, software, or data on this equipment without first consulting Bio-logic Systems Corp. Doing so may interfere with the proper operation of this software.

This product meets all of the safety and regulatory standards required for evoked potential medical equipment. Because computer systems have a wide range of performance characteristics, the host computer for this system must meet the following minimum requirements to ensure the MASTER program performs as intended.

## Specifications

|                         |                                                                                                                                                                                                                                                  |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Computer System</b>  | <ul style="list-style-type: none"> <li>—Pentium or Celeron IBM compatible computer (166 MHz or better)</li> <li>—A minimum of 128 MB dynamic RAM memory</li> <li>—20 GB Hard Disk</li> <li>—Windows mouse driver installed on system.</li> </ul> |
| <b>Operating System</b> | —Windows 98, 2000, XP                                                                                                                                                                                                                            |
| <b>Disk Drives</b>      | —Rewritable CD-ROM drive                                                                                                                                                                                                                         |
| <b>UL Compliance</b>    | An isolation transformer if computer chassis leakage exceeds 100 microamps.                                                                                                                                                                      |
| <b>Printing Devices</b> | Any Windows 98/2000/XP compatible printer.                                                                                                                                                                                                       |
| <b>Other Hardware</b>   | Navigator® Pro EP unit and accessories.<br>IEC 60950 compliant computers, printers, and other accessories                                                                                                                                        |

## To find customer support

Bio-logic is committed to customer satisfaction. Use the following customer support numbers for ordering supplies, obtaining information on training courses and service contracts, or to find answers not addressed in the On-line Help or this manual.

To obtain customer support:

Call Bio-logic's toll free number at **1-800-272-8075** and follow the voice prompts

You can also reach Customer Support by FAX at **847-949-8615** or via e-mail at [support@blsc.com](mailto:support@blsc.com).

To obtain after hours assistance:

Call Bio-logic's toll free answering service number at **1-800-332-3114**.

An operator will page a customer support representative to answer the call.

## Ordering Supplies

To order supplies:

**Call: 1-800-456-5205**

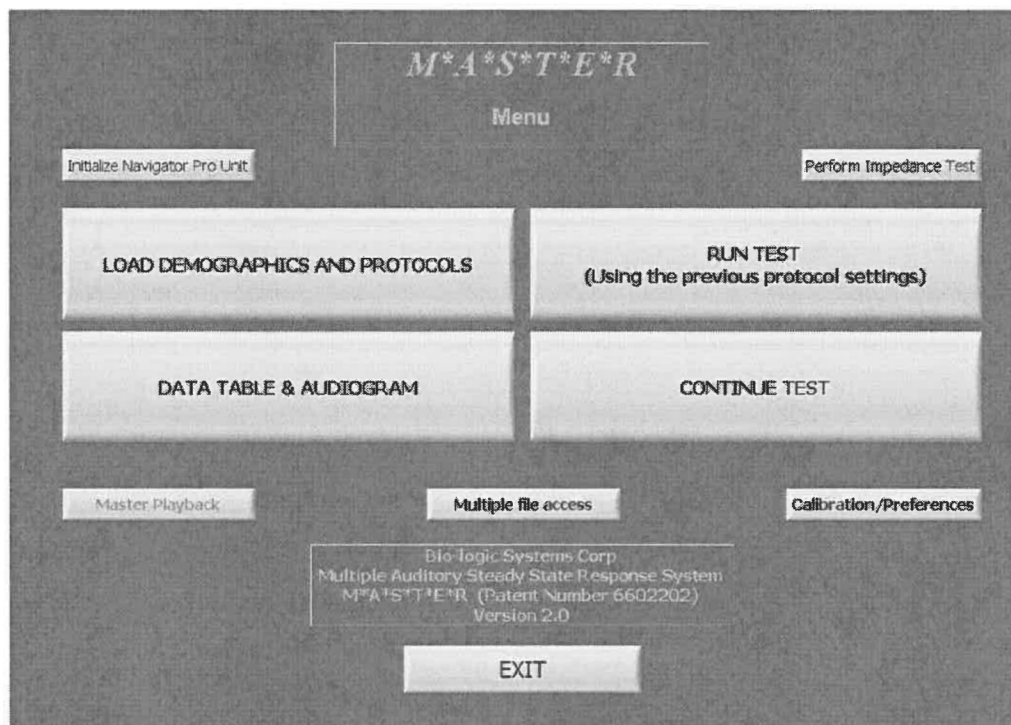
**FAX: 847-949-0219**

For frequently ordered supplies, see the Bio-logic Systems Corp. *Hearing Products Catalog*.

## Display Layouts

This section contains a brief introduction to the types of display that appear on your computer screen as you use the MASTER program.

### Command buttons



Many screens in the MASTER contain command buttons. These buttons control a program action such as starting or stopping a process or displaying a new screen. Use the system mouse to select (click on) these buttons. If your system does not support a mouse or other pointing device, please consult your computer's documentation for information about selecting program options.

The illustration shows the MASTER Main Menu and its command buttons. Complete descriptions of each of these buttons appear in the Descriptions section of this document.



## Safety and Proper Use Information



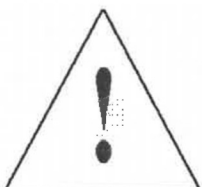
### WARNING

Never turn power on or off with a patient connected to the system. Only qualified personnel should use this device. Please read this section before installing any of the hardware. Refer to this section when you operate, transport, store, or re-install the system.



### WARNING

All of the disposable supplies from Bio-logic Systems Corp. that are coupled to the scalp are latex-free and comprised of hypoallergenic material. Bio-logic is not responsible for disposable items purchased from another vendor. Carefully read and follow the proper use instructions that accompany any disposable items.



### WARNING

Make sure that any platform, table, cart, or other surface used during the operation, transport, or storage of the system and its components is adequate to the task. Bio-logic Systems Corp. is not responsible for any injury or damage that may result from inadequate, poorly constructed, or unapproved transports, carts, tables, or other support or operating surfaces.



### WARNING

Never use equipment that has parts missing or equipment that might contain loose parts inside of it (that is, inside an enclosed portion of the equipment). If you suspect a piece of equipment has missing or loose parts, make contact with Bio-logic System Corp.



### WARNING

Never place powered equipment (that is, equipment that operates with an electric power source) on any flammable surface. Avoid this whether the equipment is active or not.

## INTRODUCTION

When a facility buys the MASTER system as a kit (without the computer), the facility must make sure that the computer that they have supplied meets the regulatory requirements for a medical grade system. If the computer's current leakage exceeds 100 milliamps, an isolation transformer is necessary. Operating the computer via battery may resolve the need for an isolation transformer.

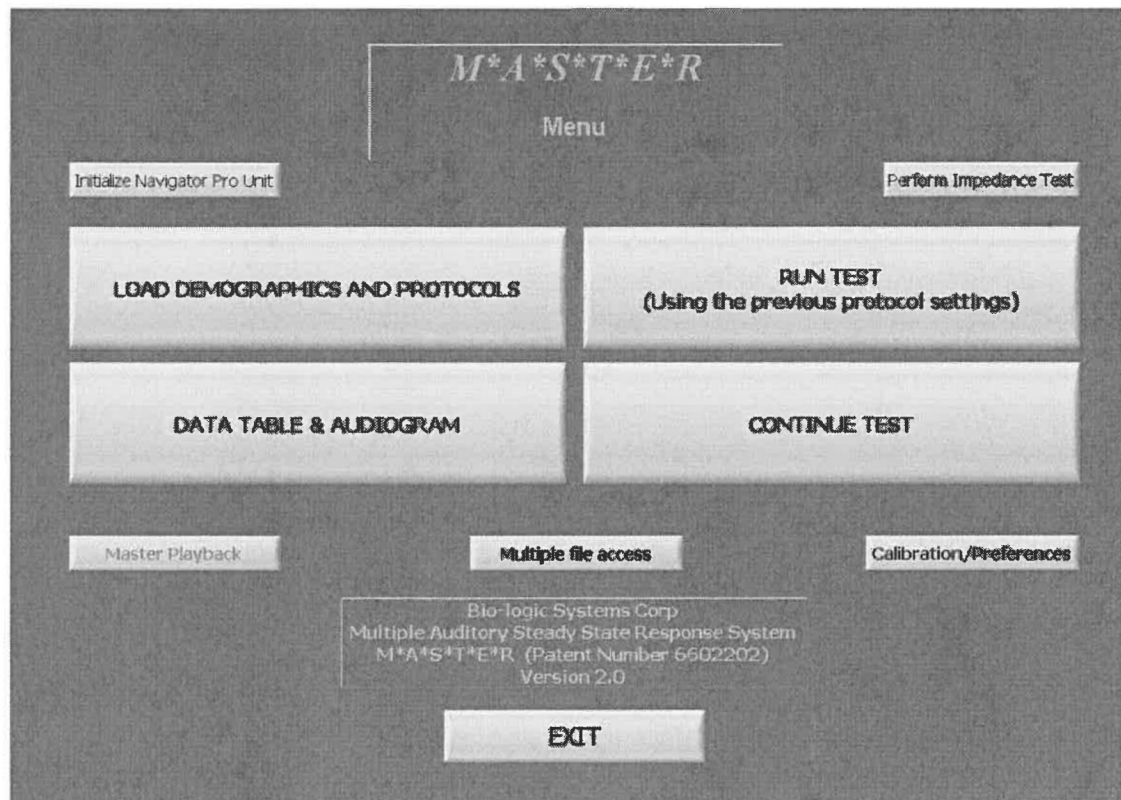
Complete systems supplied by Bio-logic Systems Corp. meet the regulatory requirements for a medical grade product as long as the system is used correctly. An isolation transformer comes with the system. Plug all components that require electricity into the isolation transformer.

**Note: The isolation transformer supports the data collection module, a notebook computer, and a deskjet -type printer. It does not meet the specifications required to support a desktop computer and monitor or a laser printer.**

For standard precautions and safety instructions, see Appendix A.

## DESCRIPTIONS: MAIN SCREEN

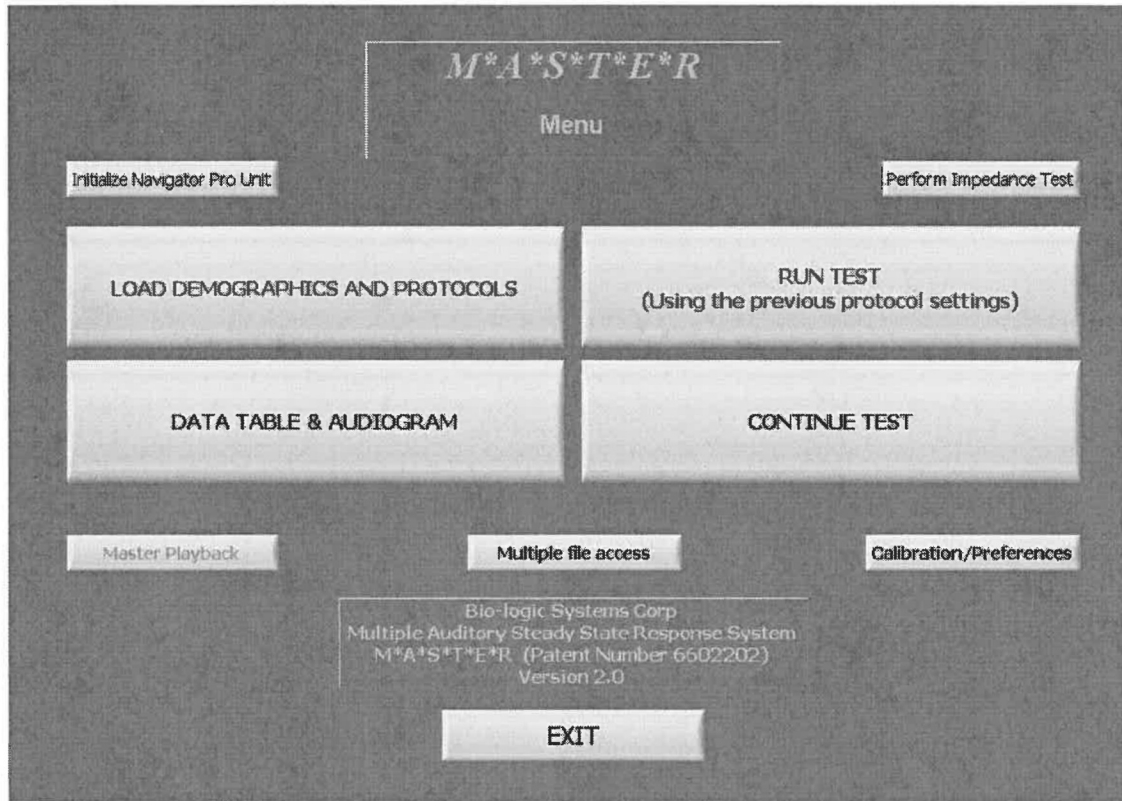
### Primary command buttons



The Primary Command Buttons appear on the "MASTER Main Menu" screen (that is, the first screen that appears when you start the MASTER program). The illustration shows these command buttons. The table lists and describes them.

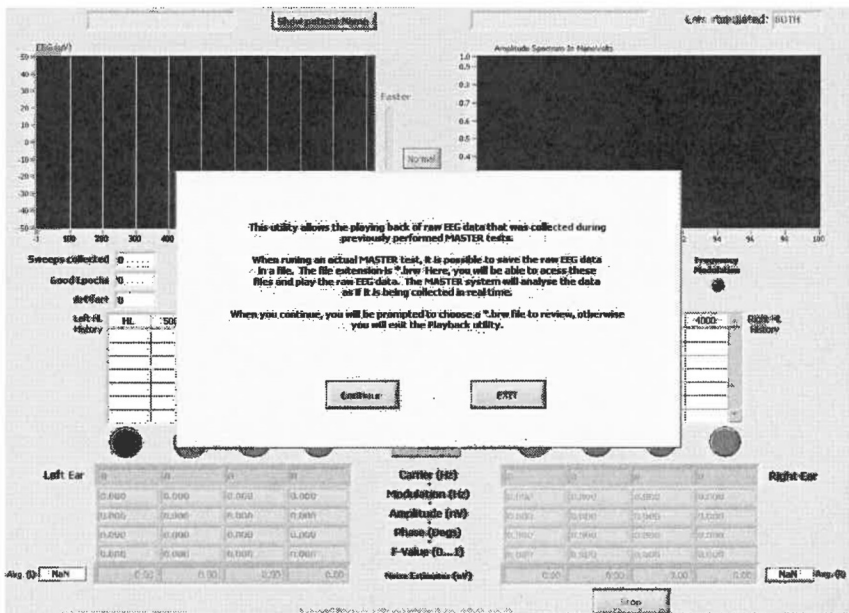


## Descriptions: Main Screen



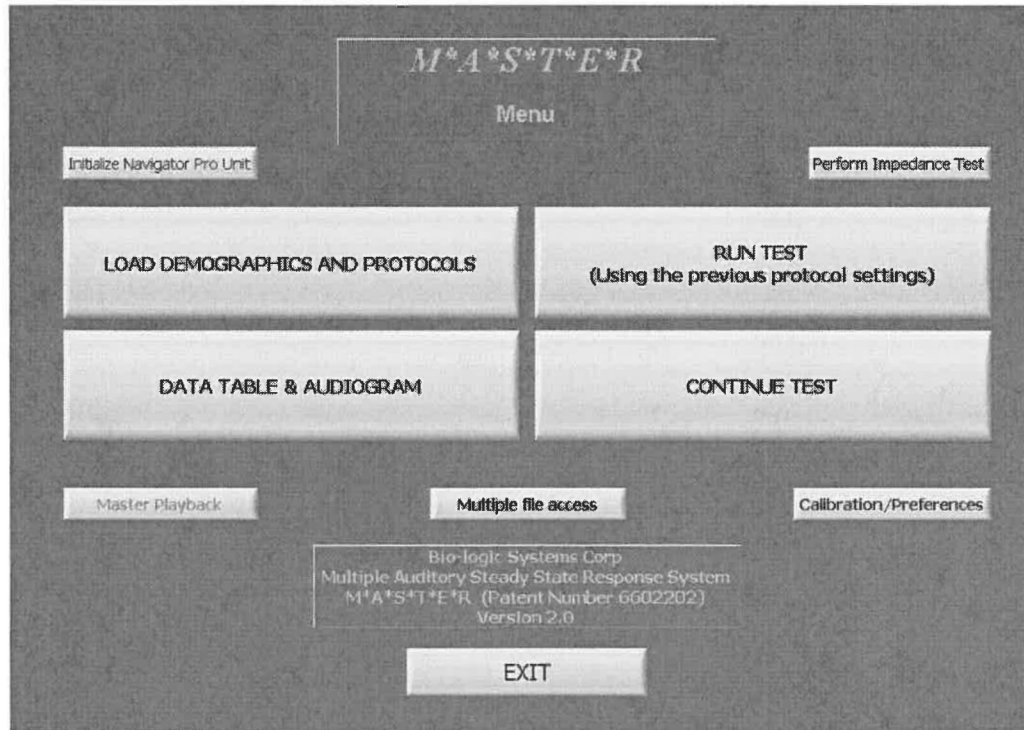
### Primary Command Buttons

| Command Button                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initialize Navigator® Pro Unit  | Select (click on) this command button to initialize (that is, activate and begin communicating with) the Navigator® Pro device.                                                                                                                                                                                                                                                                                                            |
| Perform Impedance Test          | Select (click on) this command button to run an impedance test for the Navigator® Pro device. The MASTER program then prompts you to continue the Impedance test for better values or Exit the Impedance test. The MASTER program also prompts you when one of the electrodes is open. It pauses the impedance test to let you reapply the electrode and continues when you select (click on) the OK command button in the prompt display. |
| Load Demographics and Protocols | The Load Demographics and Protocols command button is the gateway to the MASTER program. Select (click on) it and the program leads you through the series of screens that let you set protocols for and run a MASTER test. For more information, see the <u>Operating Screens</u> portion of this document.                                                                                                                               |

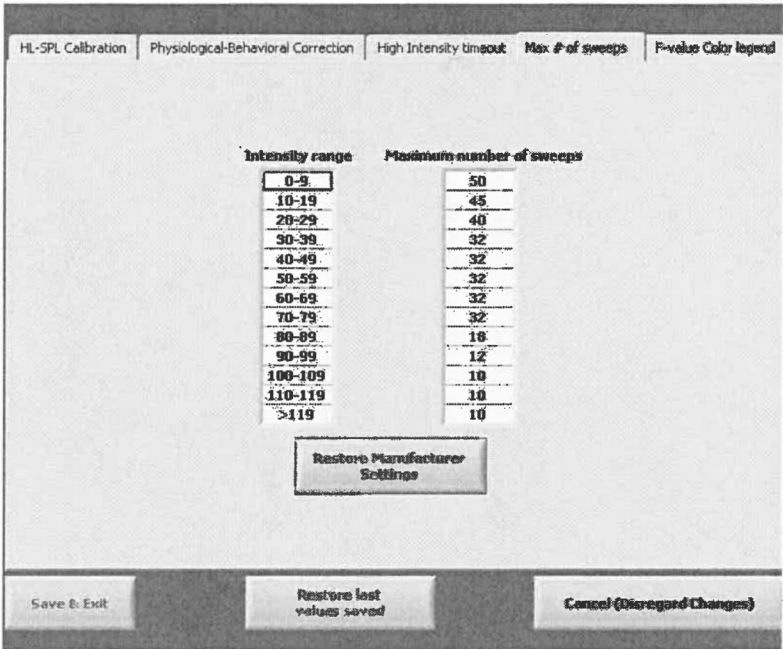
| Command Button                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Table & Audiogram                             | The Data Table & Audiogram command button takes you to a series of screens that let you analyze the results of a MASTER test. For more information, see the <u>Operating Screens</u> portion of this document.                                                                                                                                                                                                                                                                                 |
| Run Test<br>(Using the previous protocol settings) | This command button starts a new test using the old protocol settings. That is, the program prompts you for patient info and then goes directly to the collection process. If no protocol has been loaded, this button works the same way as the <b>Load Demographics and Protocols</b> command button.                                                                                                                                                                                        |
| Continue Test                                      | This command button lets you continue a test that you have suspended.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Master Playback                                    | <p>Click on this command button to playback raw EEG data from earlier MASTER tests. A display appears that explains the purpose of the playback utility and tells you how you can proceed. This display looks like this:</p>  <p>Click the Continue command button to launch a dialog box where you can select the file you want. See the Other Operating Screens section of this document for details.</p> |



## Descriptions: Main Screen



| Command Button       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Multiple file access | <p>This command button launches a dialog box that lets you gain access to multiple files or tests simultaneously. This dialog box looks like this:</p> <p>This dialog box lets you select as many as 6 files of each type (air conduction, bone conduction, and sound field) for simultaneous display in statistics tables. In this way, the program can generate a single audiogram from multiple tests or files. For more information, see the Other Operating Screens section of this document.</p> |

| Command Button          | Description                                                                                                                                                                                                                                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calibration Preferences | <p>Click this command button to display a set of tabs that let you set up user-definable parameters. This tab set looks like this:</p>  <p>For more information, see the Other Operating Screens section of this document.</p> |
| Exit                    | On this screen, the Exit command button closes the MASTER program.                                                                                                                                                                                                                                                |

## Notes

Use this page for your own notes.

## Descriptions: Operating Screens

This section presents illustrated descriptions of the screens that appear during normal operation of the MASTER program.



## The Patient Information screen

The Patient Information screen is a data entry tool for the MASTER program. At this screen, you can register a new patient or change demographic information for an existing patient. To reach this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Load Demographics and Protocols command button.  
This launches the Patient Information screen.

The illustration shows the Patient Information screen. The table lists and describes its components.

**The Patient Information Screen**

| Component                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Patients File Name field | This read-only field contains the name for the test file associated with the Patient ID code. The MASTER program generates this file name from the names in the Last Name field, First Name field, the test date, and the test time. It uses an underscore (" _ ") to separate these components.                                                                                                                                                                                 |
| Patient ID field         | The Patient ID field is an alphanumeric, data entry field. It lets you enter a unique code that identifies the patient to the MASTER system. Type this code into this field directly. For more information, see the <a href="#">Entering and saving patient information</a> section of this document.                                                                                                                                                                            |
| Test date field          | The test date field is read-only and contains two types of information:<br><b>For existing patients:</b> The Test Date field contains the date when the Tester conducted the test.<br><b>For new patients:</b> The Test Date field contains the current date.<br><b>Note:</b> For new patients, the MASTER program uses the computer's calendar function to complete the Test date field. For accurate information, make sure that your computer is tracking the date correctly. |

## DESCRIPTIONS: OPERATING SCREENS

| Component                                | Description                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clear Patient Information command button | This command button lets you clear data from the fields of this screen and enter patient information.                                                                                                                                                                                                                                                 |
| Cancel command button                    | This command button closes the Patient Information screen and returns you to the MASTER Main Menu screen.                                                                                                                                                                                                                                             |
| Last name field                          | This alphanumeric, data entry or display field contains the surname for the patient associated with the Patient ID code.                                                                                                                                                                                                                              |
| First Name field                         | This alphanumeric, data entry or display field contains the given name for the patient associated with the Patient ID code.                                                                                                                                                                                                                           |
| Birthdate field                          | <p>This alphanumeric, data entry or display field contains the date of birth for the patient associated with the Patient ID code.</p> <p><b>Note: You may enter this date in any format you wish.</b></p>                                                                                                                                             |
| Gender field and spin button             | <p>This field contains the sex of the patient associated with the Patient ID code. Select (click on) the spin button to toggle its content between Male and Female.</p>                                                                                                                                                                               |
| Tester field                             | This alphanumeric, data entry or display field contains the name of or other identification data for the tester who performed the test associated with the Patient ID code.                                                                                                                                                                           |
| Physician field                          | This alphanumeric, data entry or display field contains the name of or other identification data for the Physician in charge of the test procedure associated with the Patient ID code.                                                                                                                                                               |
| Save & Continue command button           | The Save & Continue command button writes three files to the disk. By default the files go to the \Data subdirectory where the program resides. The files are in an ASCII format, use the name supplied by the Patient File Name text box, and have the extensions *.aud, *.cnt, and *.dat. The system writes patient information to all three files. |

## The Test Parameters screen

**TEST PARAMETERS**

Choose Protocol:

|                   | Left Ear |       |       |       | Right Ear |       |       |       |
|-------------------|----------|-------|-------|-------|-----------|-------|-------|-------|
|                   | 1        | 2     | 3     | 4     | 5         | 6     | 7     | 8     |
| Carrier Frequency | 500      | 1000  | 2000  | 4000  | 500       | 1000  | 2000  | 4000  |
| Modulation (Hz)   | 82.00    | 84.00 | 87.00 | 89.00 | 91.00     | 94.00 | 96.00 | 99.00 |
| FM Percentage     | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| FM phase          | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| Frequency ON/OFF  | ON       | ON    | ON    | ON    | ON        | ON    | ON    | ON    |

LEFT EAR RIGHT EAR

Initial HL in dB:  AN Percentage:

Final HL in dB:  Choose Ear:

dB Step:  Choose Transducer:

Artifact Rejection (uV):  Epochs / sweep:

The Test Parameters screen is an interactive data entry tool that you can use to customize the stimuli for a MASTER test. To reach this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Load Demographics and Protocols command button.  
The Patient Information screen appears.
3. Complete the Patient Information screen.
4. Select (click on) the Save & Continue command button.

The illustration shows the Test Parameters screen. The table lists and describes its components.



**The Test Parameters screen**

| Component                                        | Description                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Choose Protocol data entry field and spin button | This field contains a list of protocols. Use the spin button to move through the protocols available. To see the list of protocols, click inside the field or turn to the <u>Protocols</u> section of this document. For operating information, see the <u>Configuring protocols for a test: the Test Parameters screen</u> section of this document. |
| Click to discard/Save RAW EEG data               | Use this toggle switch to:<br><br>—Save RAW EEG data to a file (this may slow down the operation of the system)<br><br><b>OR</b><br><br>—Discard RAW EEG data (this cancels the system's Save operation)                                                                                                                                              |
| Carrier Frequency data entry fields              | The frequencies in these read-only fields are determined by the selection you make in the Choose Protocol field. As many as four frequencies per ear—or eight per protocol—are possible.                                                                                                                                                              |
| Modulation (Hz) fields                           | Each of these fields shows a default modulation that the program uses at its associated frequency in the protocol that you choose. Currently, these fields are read only.                                                                                                                                                                             |
| FM Percentage fields                             | Each of these fields shows the percentage of modulation that each tone deviates from its central carrier frequency. The program default is 20%. Currently, these fields are read only, but you can enable and disable FM modulation with the Enable/Disable FM command button.                                                                        |
| FM Phase fields                                  | Each of these fields shows the phase setting of the FM. Currently, these fields are read only, but you can set and reset their values with the Enable/Disable FM command button.                                                                                                                                                                      |
| Enable Exponential Modulation checkbox           | Select (click on) this checkbox:<br>—Until a checkmark appears to allow exponential modulation.<br>—Until no checkmark appears to prohibit exponential modulation.                                                                                                                                                                                    |
| Disable/Enable FM command checkbox               | Select (click on) this button:<br><br>—Until a checkmark appears to Enable the FM percentage fields. Here, the MASTER program changes the values in the fields to the system default value.<br><br>—Until no checkmark appears to disable the FM percentage fields. Here, the MASTER program changes the values in the fields to zero (0).            |

## DESCRIPTIONS: OPERATING SCREENS

**TEST PARAMETERS**

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000 Click to discard RAW EEG test data  
(Cancel save operation)

|                   | Left Ear |       |       |       | Right Ear |       |       |       |
|-------------------|----------|-------|-------|-------|-----------|-------|-------|-------|
|                   | 1        | 2     | 3     | 4     | 5         | 6     | 7     | 8     |
| Carrier Frequency | 500      | 1000  | 2000  | 4000  | 500       | 1000  | 2000  | 4000  |
| Modulation (Hz)   | 82.00    | 84.00 | 87.00 | 89.00 | 91.00     | 94.00 | 96.00 | 99.00 |
| FM Percentage     | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| FM phase          | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| Frequency ON/OFF  | ON       | ON    | ON    | ON    | ON        | ON    | ON    | ON    |

LEFT EAR                      RIGHT EAR

Initial HL in dB: 60 AM Percentage: 100

Final HL in dB: 30 Choose Ear: BOTH

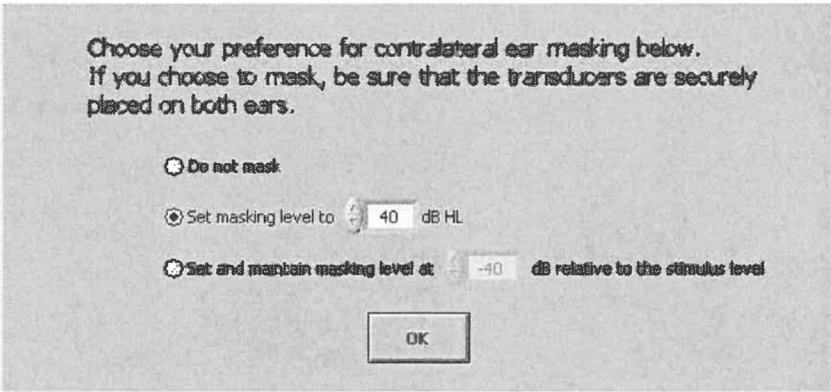
dB Step: 10 Choose Transducer: Inserts

Artifact Rejection (uV): 40 Epochs / Sweep: 16

Back Use these Settings

| Component                                                                           | Description                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency ON/OFF switches                                                           | Select (click on) these controls to turn a particular frequency ON or OFF. The ON or OFF status determines whether the application presents a frequency to the test subject. This control lets you select a subset of stimuli for any test.                                                                 |
|  | <p style="text-align: center;"><b>WARNING</b></p> <p>The MASTER application warns testers whenever they select an intensity that may harm the patient's hearing. For complete information about these warnings, see the <u>Handling High and Maximum Intensity conditions</u> section of this document.</p> |



| Component                                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial HL in dB data entry field and spin button | This data entry field lets you set the initial (starting) HL in decibels. You can type the value into this field directly, or you can use the spin buttons to increment (up button) or decrement (down button) to the value that you want. Valid ranges for this field vary depending on the frequencies and the transducers that you choose. Various informative or warning messages appear depending on the intensity value that you use. Note that 81 dB or higher forces the tester to reduce the number of frequencies to one per ear maximum. When testers select high intensities (>92 dB HL), warning messages appear.                                                                                                                                                                       |
| AM Percentage data entry field and spin button    | This read-only field shows the depth of AM applied to the carrier. The default value is 100%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Final HL in dB data entry field and spin button   | This data entry field lets you set the final (ending) hearing level (HL) in decibels. You can type the value into this field directly, or you can use the spin buttons to increment (up button) or decrement (down button) to the value that you want. Valid ranges for this field vary depending on the frequencies and the transducers that you choose. When testers select high intensities, a warning message appears.                                                                                                                                                                                                                                                                                                                                                                           |
| Choose Ear field and spin button                  | <p>This field lets you choose the ear or ears you want to test with the parameters you have chosen. Select (click on) the spin button (or click inside the field) to see these options:</p> <p><b>Right</b>—Run the MASTER test for the right ear with the parameters that appear on this screen (see NOTE).</p> <p><b>Left</b>—Run the MASTER test for the left ear with the parameters that appear on this screen (see NOTE).</p> <p><b>Both</b>—Run the MASTER test for both ears with the parameters that appear on this screen.</p> <p><b>Note:</b> When you select a single ear, the program launches a dialog box that lets you choose to mask or not mask signals. This dialog box looks like this:</p>  |

## DESCRIPTIONS: OPERATING SCREENS

**TEST PARAMETERS**

Choose Protocol:  Click to discard RAW EEG test data (Cancel save operation)

Carrier Frequency:

Modulation (Hz):         ☒ Check to Enable Exponential Modulation

FM Percentage:         ☐ Check to Enable FM

FM phase:

Frequency ON/Off:

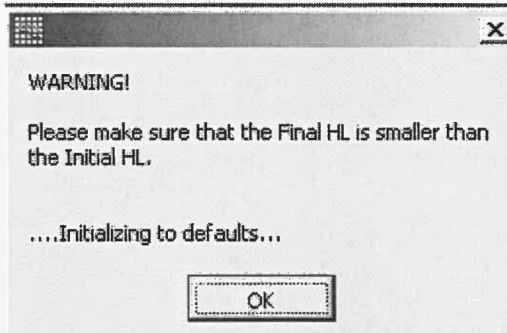
LEFT EAR RIGHT EAR

Initial HL in dB:  AM Percentage:

Final HL in dB:  Choose Ear:

dB Step:  Choose Transducer:

Artifact Rejection (uV):  Epochs / Sweep:

| Component                                                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>WARNING</b></p> <p>The MASTER application warns testers whenever they select a final intensity that is higher than the initial intensity. This warning looks like this:</p>  <p>Make sure that the value that you enter in the Final HL in dB data entry field is correct. To clear this WARNING, click on the OK command button.</p> |

## DESCRIPTIONS: OPERATING SCREENS

| Component                                                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                  |                                                          |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------|
| dB Step spin button                                                              | <p>This data entry and display field shows the user the value that the MASTER program is using to decrement the current testing hearing level to the next one. The field gives the user a list of dB step values. Use the spin button to increment or decrement through these values. Choices are 1, 2, 3, 5, 10, and 20.</p>                                                                                                                                                                                                                                                                                                                                   |                                                                                  |                                                          |
| Choose Transducer field and spin button                                          | <p>This field lets you choose the type of transducer you want to use with the MASTER system. Select (click on) the spin button (or click inside the field) to see these options:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>Headphones</b></p> <p><b>Inserts</b></p> <p><b>Free Field Speakers</b></p> </td><td style="width: 50%; vertical-align: top;"> <p><b>Bone Conduction</b></p> <p><b>Ear Muffins®</b></p> </td></tr> </table> <p>Then, click on the option you want (checkmark appears). Selecting Bone Conduction or Ear Muffins may trigger other messages and dialog boxes to appear.</p> | <p><b>Headphones</b></p> <p><b>Inserts</b></p> <p><b>Free Field Speakers</b></p> | <p><b>Bone Conduction</b></p> <p><b>Ear Muffins®</b></p> |
| <p><b>Headphones</b></p> <p><b>Inserts</b></p> <p><b>Free Field Speakers</b></p> | <p><b>Bone Conduction</b></p> <p><b>Ear Muffins®</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                  |                                                          |

## DESCRIPTIONS: OPERATING SCREENS

**TEST PARAMETERS**

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000 Click to discard RAW EEG test data (Cancel save operation)

|                   | Left Ear |       |       |       | Right Ear |       |       |       |
|-------------------|----------|-------|-------|-------|-----------|-------|-------|-------|
|                   | 1        | 2     | 3     | 4     | 5         | 6     | 7     | 8     |
| Carrier Frequency | 500      | 1000  | 2000  | 4000  | 500       | 1000  | 2000  | 4000  |
| Modulation (Hz)   | 02.00    | 04.00 | 07.00 | 09.00 | 01.00     | 04.00 | 06.00 | 09.00 |
| FM Percentage     | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| FM phase          | 0.00     | 0.00  | 0.00  | 0.00  | 0.00      | 0.00  | 0.00  | 0.00  |
| Frequency ON/OFF  | ON       | ON    | ON    | ON    | ON        | ON    | ON    | ON    |

LEFT EAR                      RIGHT EAR

Initial HL in dB: 60                      AM Percentage: 100

Final HL in dB: 30                      Choose Ear: BOTH

dB Step: 10                      Choose Transducer: Inserts

Artifact Rejection (uV): 40                      Epochs / Sweep: 16

Back                      Use these Settings

| Component                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Artifact Rejection (uV)<br>data entry field and spin<br>button | <p>This data entry field displays the criteria that the MASTER application uses to reject EEG data collected from the patient during the test. You can type the value into this field directly, or you can use the spin button to increment (up button) or decrement (down button) to the value that you want. Valid range for this field is 1 to 1000.</p> <p><b>NOTE: Exceeding the valid range for this field generates an Invalid Input message box. Click on the OK command button to reset the value to a default (80).</b></p> |



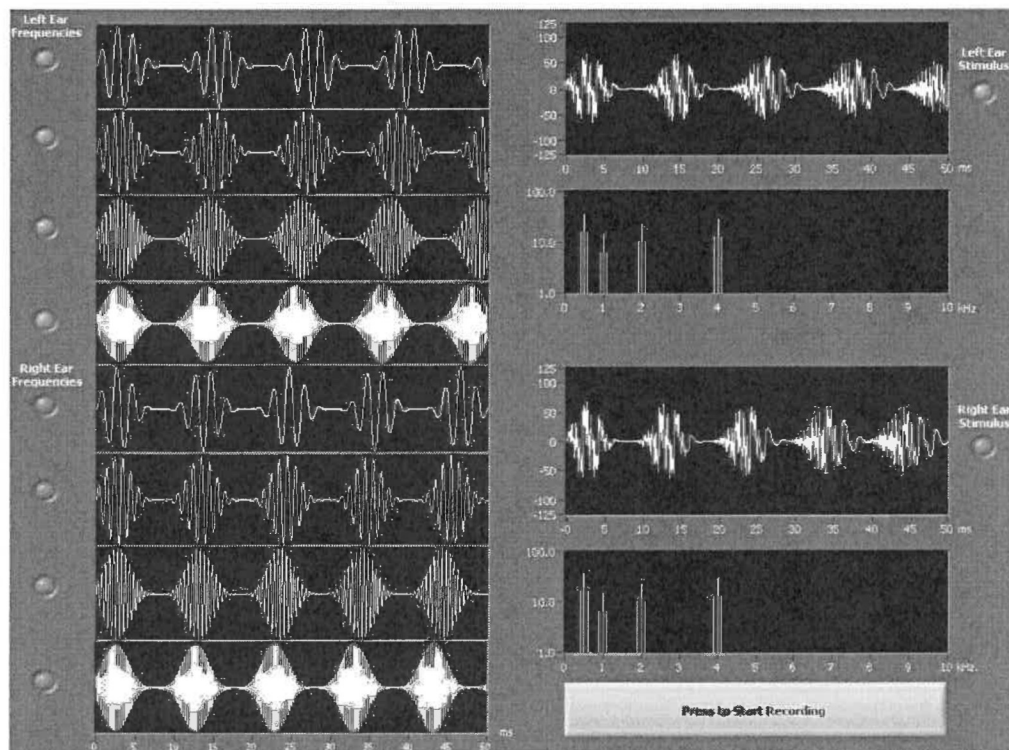
**DESCRIPTIONS: OPERATING SCREENS**

| <b>Component</b>                                | <b>Description</b>                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Epochs / Sweep data entry field and spin button | This data entry field lets you set how many epochs the MASTER calculates per sweep before it performs the FFT (Fast Fourier Transform.) Values include 2, 4, 8, and 16. You can type the value into this field directly, or you can use the spin button to increment (up button) or decrement (down button) to the value that you want. |
| Back command button                             | Select (click on) this command button at any time to close the Test Parameters screen without making any changes or running any test. The MASTER program returns to the MASTER Main Menu.                                                                                                                                               |
| Use these Settings command button               | Select (click on) this command button to accept the settings you have made to this screen, close this screen, and launch the Stimulus Creation screen.                                                                                                                                                                                  |

## NOTES

Use this page for your own notes.

## The Stimulus Creation screen



**Note:** The Press to Start Recording command button does not appear on this screen until the program is ready to start the test.

The Stimulus Creation screen displays graphs of the stimuli that the MASTER creates for the left and right ears. It consists of 8 vertical graphs on the left side of the screen and four vertical graphs on the right. The 8 graphs on the left represent each of the frequencies selected for the test. The top four represent the frequencies selected for the left ear and the bottom four for the right.

The top graph on the right represents the time domain for left ear frequencies that make the left ear stimulus. The second graph from the top is the frequency domain analysis of the left ear stimulus; its spikes represent the amplitude of the frequencies that the MASTER combines with the left ear stimulus. The bottom two graphs on the right represent the same as above for the right ear.

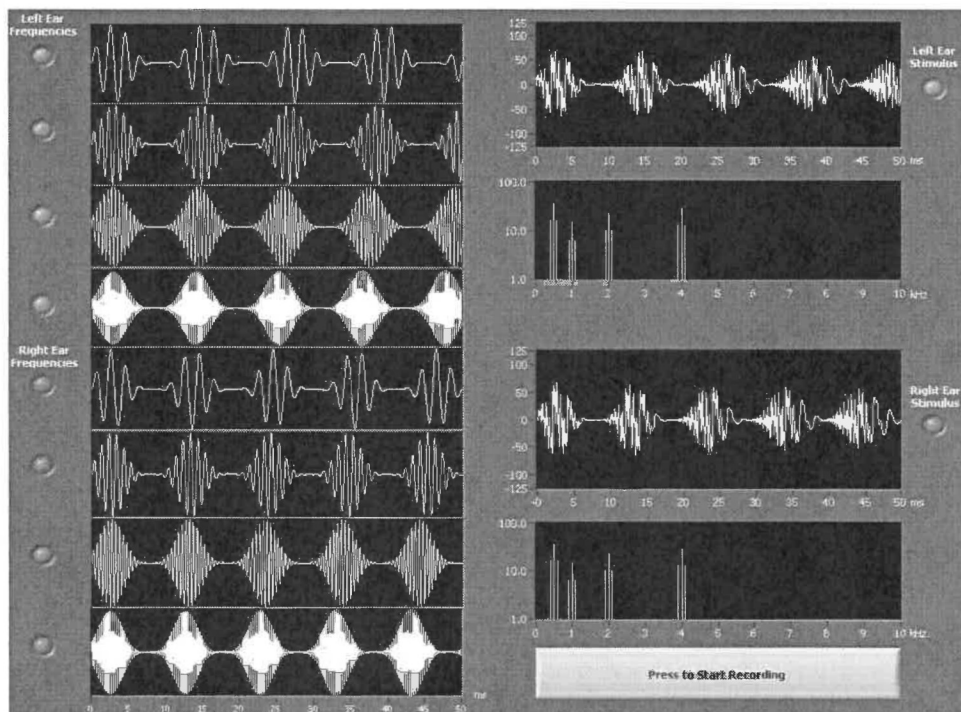
The illustration shows a sample Stimulus Creation screen. To reach this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Load Demographics and Protocols command button.  
The Patient Information screen appears.
3. Complete the Patient Information screen.
4. Select (click on) the Save & Continue command button.

## DESCRIPTIONS: OPERATING SCREENS

5. Set parameters as required.  
See Configuring protocols for a test: the Test Parameters screen in the Operating Screens sections of this document.
6. Select (click on) the Use these Settings command button.

The Stimulus Creation screen has only one control. The table describes it.



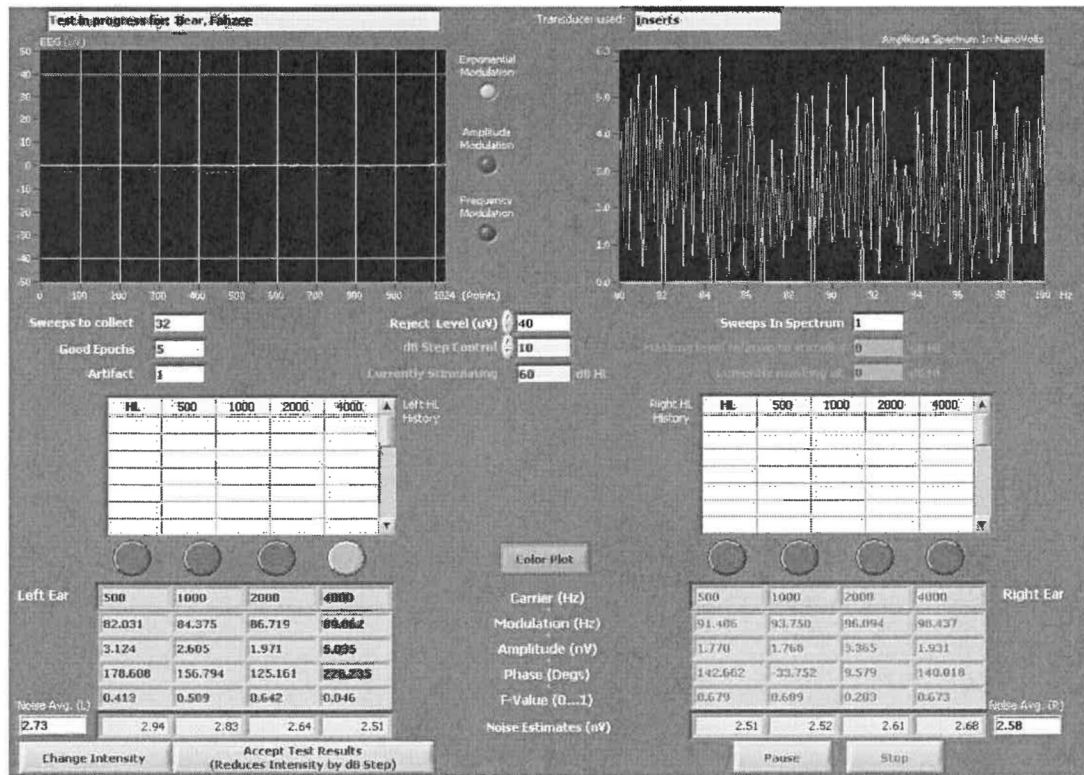
**The Stimulus Creation: Recording screen**

| Control                                 | Description                                                                 |
|-----------------------------------------|-----------------------------------------------------------------------------|
| Press to Start Recording command button | Select (click on) this screen to launch the Test screen and start the test. |

**Note:** Once the MASTER creates the stimulus, a progress bar appears that tracks downloading the stimulus to the Navigator® Pro unit. The Press to Start Recording command button does not appear until the download ends and the progress bar disappears.



## The Test screen



**Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).**

The Test screen is one of the main operating screens of the MASTER system. It contains interactive displays and tools that you can use to monitor and control the data collection process. To reach this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Load Demographics and Protocols command button.  
The Patient Information screen appears.
3. Complete the Patient Information screen.
4. Select (click on) the Save & Continue command button.

## DESCRIPTIONS: OPERATING SCREENS

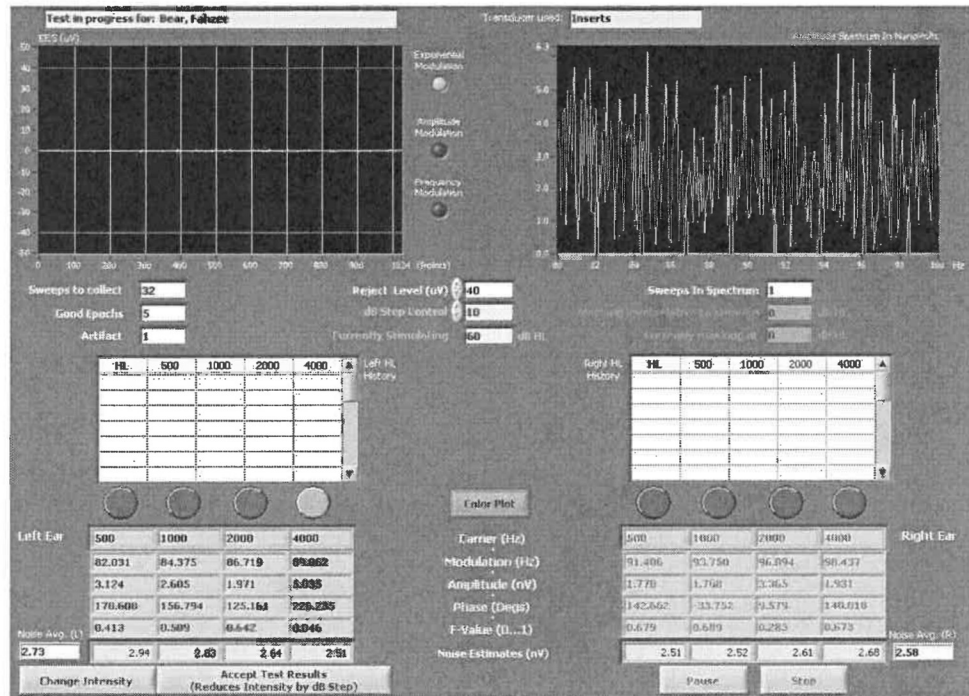
5. Set parameters as required.  
See Configuring protocols for a test: the Test Parameters screen in the Operating Screens sections of this document.
6. Select (click on) the Use these Settings command button.  
The Stimulus Creation screen appears.
7. Wait until the message box and fill bar disappear.
8. Select (click on) the Press to Start Recording command button.

The illustration shows the Test screen. The table lists and describes its components.

**The Test screen**

| Component                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test in progress for field            | This field holds the name of or other identification information for the patient you are testing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Transducer Used field                 | This field displays the transducer you are using for the test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| EEG chart                             | The EEG chart displays the incoming electrophysiological signal. Its y-axis spans +/-100 uV and its x-axis shows the data points of the current epoch. Horizontal lines on this chart show the artifact-rejection limits (these are red on the computer screen). If the current epoch contains values that exceed these limits, the MASTER system rejects them (that is, it does not average them and does not store them in the raw data file).                                                                                                                                                                                                                                                                                                                                                                               |
| Modulation indicators                 | These indicators show the modulation that the MASTER program is applying to the test frequency. These include Exponential Modulation, Amplitude Modulation, and Frequency Modulation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Amplitude Spectrum in Nanovolts chart | The Amplitude Spectrum chart displays the amplitude spectrum of the average response. The MASTER system measures amplitude as the base-to-peak amplitude of the wave provided by the FFT. The data that goes to the FFT is the average response of the subject. The system obtains this value by adding each recorded sweep to a running sum and dividing this by the number of sweeps collected. Therefore, the system updates this display each time it collects enough artifact-free data epochs to add an additional sweep to the average. The x-axis normally spans the protocol's modulation frequencies. The system automatically scales the y-axis according to the highest amplitude value. You can also configure the axes by clicking the mouse on a value on the axis and inputting a new value from the keyboard. |
| Sweeps to collect field               | This field defines the number of sweeps to collect per each hearing level. Values can range from 1 to 64.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## DESCRIPTIONS: OPERATING SCREENS



| Component                           | Description                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Good Epochs field                   | This read-only field displays the number of good epochs collected in the current sweep. A good epoch has all of its points within amplitude that is within the artifact rejection limits.                                                                                                                                             |
| Artifact field                      | This read-only field is a counter that displays how many artifacts the system rejected during the collection of the current sweep.                                                                                                                                                                                                    |
| Reject Level ( $\mu\text{V}$ )      | This display and data entry field lets you determine the microvolt level where the MASTER rejects an epoch. The default value is 40 $\mu\text{V}$ . To change the value in this field, type a value in directly or select (click on) the spin buttons to increment or decrement the value.                                            |
| dB Step control display field       | This display and data entry field shows difference between the current hearing level tested and the next one. To change the value in this field, type a dB value in directly or select (click on) the spin buttons to increment or decrement through the dB values the system allows. Permitted values are 1, 2, 3, 5, 10, 15, 20 dB. |
| Currently Stimulating display field | This read-only display field shows the currently stimulating Hearing Level in dB.                                                                                                                                                                                                                                                     |

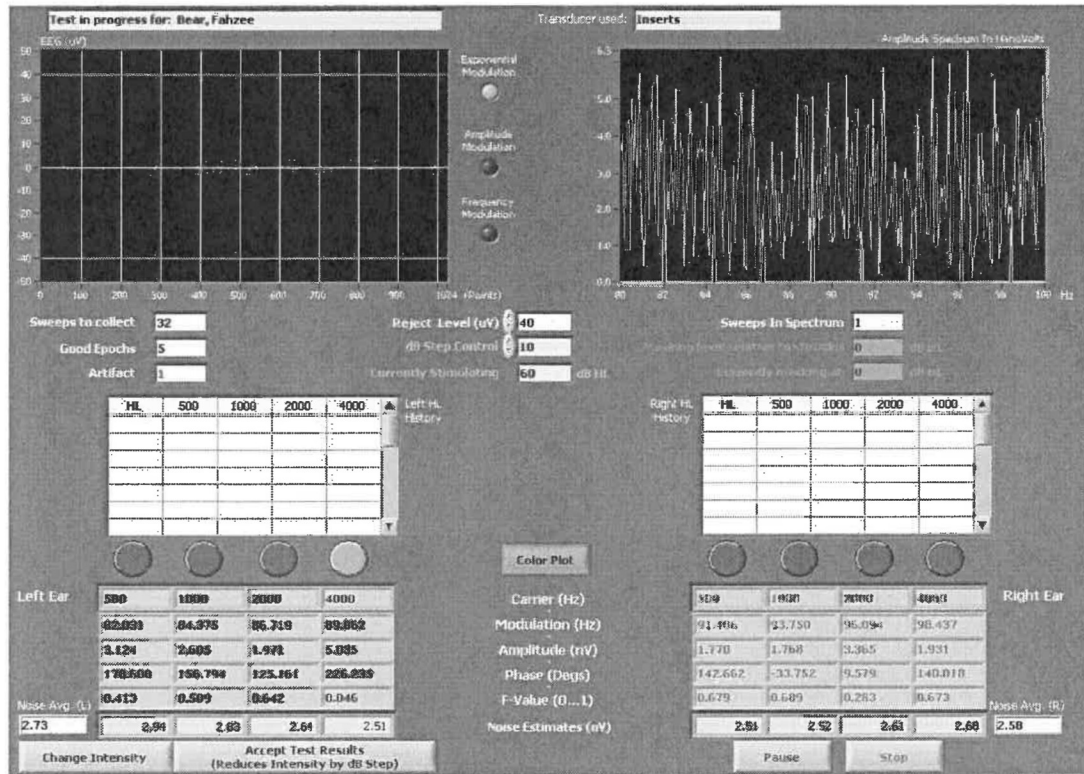


## DESCRIPTIONS: OPERATING SCREENS

| Component                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sweeps in Spectrum field                 | This read-only field shows the number of sweeps that were analyzed by the MASTER application. The spectrum refers to the amplitude spectrum graph.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| History tables                           | These tables are active after you accept test results or change intensities during a collection. Then, they display the F-Values from the previous intensity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Masking level relative to stimulus field | <p>This read-only field shows the masking intensity relative to the HL intensity.</p> <p><b>Note: These fields are enabled (or active) only for single ear tests when masking is relevant. Choose the values that appear in these fields after you choose a single-ear test.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Currently masking                        | <p>This read-only field shows the current masking level.</p> <p><b>Note: These fields are enabled (or active) only for single ear tests when masking is relevant. Choose the values that appear in these fields after you choose a single-ear test.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Status indicators or Graphs              | <p>This area of the test screen contains either oval-shaped, color-coded status indicators or graphs.</p> <p>— <i>Color Plot Status indicators:</i></p>  <p>The eight (8) Color Plot status indicators are oval and color-coded. They let you track the results for each frequency tested. Each indicator changes color according to test results as follows:</p> <p><b>GREEN:</b> A response was detected with a confidence level of 95% or higher based on statistical analysis of the EEG.</p> <p><b>YELLOW</b> – A response may or may not be present. The statistical confidence is 90-95%.</p> <p><b>RED</b> - No significant response is present based on statistical measures.</p> <p>You can toggle between this display and the Polar Plot graphs with the COLOR PLOT/GRAPH command button.</p> |

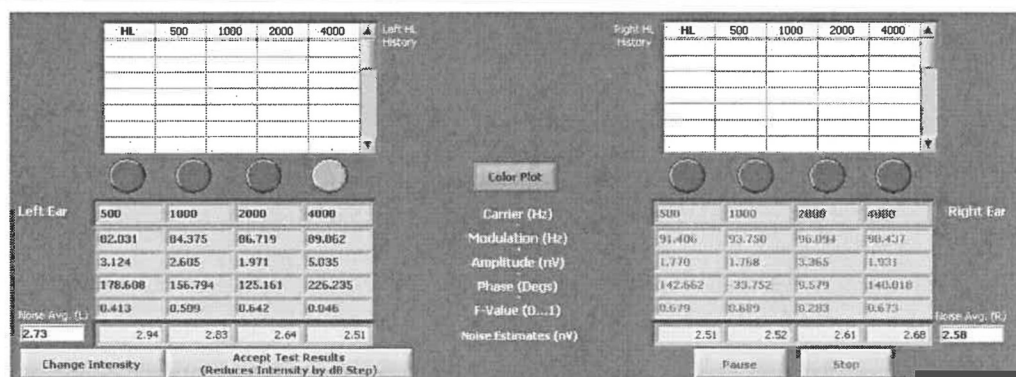


## DESCRIPTIONS: OPERATING SCREENS



| Component                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Status indicators or Graphs</p> <p>(continued)</p> | <p>— <b>Graphs:</b></p> <p>The Graphs use moving vertices to present the same information as the pass-fail indicators. The left four graphical plots represent the responses from stimuli to the left ear. Each plot shows the magnitude of the response as a vector that extends from the origin outward. The phase of the response (relative to the phase of the modulating frequency) appears as the angle between the line and the x-axis. The 95% confidence interval for the noise appears as a circle centered at the end of the vector. If a circle does not include the origin, the response lies outside of the 95% noise estimate.</p> <p>You can toggle between this display and the Pass/Fail indicators with the <b>COLOR PLOT/GRAPH</b> command button.</p> |
| <p>Color Plot/Graph command button</p>                | <p>This command button determines whether the Test screen displays oval-shaped, color indicators or a graphic plot. Select (click on) this button to toggle between the two displays.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## DESCRIPTIONS: OPERATING SCREENS



| Component                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Tables                        | <p>These read-only tables summarize the data that the test gathers for each frequency and each ear. The left four columns show the current results for the left ear stimuli, while the right four contain data for the right ear. The table lists:</p> <p><b>Carrier(Hz)</b>—Carrier frequency tested</p> <p><b>Modulation(Hz)</b>—Modulating frequency related to that carrier</p> <p><b>Amplitude (μV)</b>—Amplitude of the response to the modulating frequency (in microvolts)</p> <p><b>Phase(Deg)</b>—Phase of the response</p> <p><b>F-Value (0...1)</b>—F-value statistics (significance of the response)</p> <p>The first two values of each column describe the stimuli and therefore remain constant, the last three values change as the recording progresses.</p> |
| Avg. Noise estimate (nV) fields    | <p>These fields show the program's estimation of the noise present in the EEG generated during the test. This value appears in nanovolts (nV). To verify that no response is present, it is desirable to average until the noise is 10 nanovolts or less.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Change intensity command button    | <p>Select (click on) this command button to launch a dialog box that lets you reset intensities for the test. For more information, see the <a href="#">Using the Main Test screen</a> section of this document.</p> <p><b>Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).</b></p>                                                                                                                                                                                                                                                                                                                                                                                             |
| Accept Test Results command button | <p>Select (click on) this command button to accept the results of a specific test and automatically reduce the intensity of the stimulus by a decibel step.</p> <p><b>Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Pause Command Button               | <p>Select (click on) this command button to pause the test. Click on it again to resume the test.</p> <p><b>Note: Be aware that stimulation continues while the system is paused.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Stop command button                | <p>Select (click on) this command button to stop the test and return to the Main Menu screen.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



The Demographics and Audiogram screen contains tools that let you track statistical values for the frequencies you use to test each ear. Data in this screen is color-coded: blue represents left ear data; red represents right ear data. This screen lets you input information about the patient's hearing threshold so that the system can generate an audiogram. To reach this screen:

- The illustration shows Demographics and Audiogram screen. The table lists and describes its components.

## DESCRIPTIONS: OPERATING SCREENS

[illegible]

### The Demographics and Audiogram screen

| Component                                                   | Description                                                                                                                                |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Statistics results for field                                | This field identifies the patient whose results appear on this screen.                                                                     |
| open .aud file (Statistics and Test Results) command button | Select (click on) this command button to launch a “Choose File to Read” dialog box that you can use to load an *.aud file into the screen. |



DESCRIPTIONS: OPERATING SCREENS

| Component                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Audiogram adjustment radio buttons    | Select (click on) one of these radio buttons to adjust audiogram plots by standard correction factors. You set these correction factors in the Physiological-Behavioral Correction tab of the Calibration Preferences tab set. Choices include:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                       | <div> <p><b>Use correction:</b> Click on this radio button and the program uses the correction you set on the Physiological-Behavioral Correction tab.</p> <p><b>Ignore correction:</b> Click on this radio button and the program ignores the correction you set on the Physiological-Behavioral Correction tab.</p> </div> <div> <p><b>Better than:</b> Click on this radio button when assess the hearing threshold level as better than the value in the HL table. The Audiogram uses the better than symbol.</p> <p><b>Worse than:</b> Click on this radio button when assess the hearing threshold level as worse than the value in the HL table. The Audiogram uses the worse than symbol.</p> </div>                                                   |
|                                       | See the <a href="#">Physiological-Behavioral Correction tab</a> for details.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Transducer Used field                 | This field displays the transducer you used for the test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Left and Right Ear Frequencies fields | These sets of as many as 4 text boxes contain read-only data that display the carrier frequency of the test(s) for the left ear, the right ear, or both.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| HL fields                             | Any intensity tested during the session appears in this read-only table.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Text Boxes                            | The Text Boxes in the Test Statistics screen form tables are populated by the *.aud file that you open with the open .aud file command button. These tables start at the top of the screen. Each contains a header row with as many as four (4) frequencies and columns with 15 rows for the display of the HL test level. The data results are a read-only F statistical value and appear at the appropriate frequency and HL level. Background color of the cell matches the final color of the color plot achieved during collection. Double-clicking a cell in a data table populates the Hearing Threshold table with the corresponding HL value. The Audiogram adjustment radio buttons determine the value that appears in the Hearing Threshold table. |
| Noise columns                         | This column lists the last overall noise estimate that the program calculates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Sweeps columns                        | This column lists the number of sweeps that the program performs for this test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| The Hearing Threshold Table           | This table contains data entry fields that let you enter thresholds for each frequency based on the data in the statistics table above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## DESCRIPTIONS: OPERATING SCREENS

[illegible]

| Component                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Generate Audiogram command buttons | Select (click on) one of these command buttons to create an audiogram based on the entries you made in the Hearing Threshold Table on this screen. See <a href="#">The Audiogram screen</a> section of this document for details.                                                                                                                                                                                                                                                                                                           |
| Aud File Path field                | <p>This read-only field displays the path where the *.aud file that you choose resides. For example, a path that looks like this:</p> <p style="text-align: center;">C:\Aud files\Our clinic\MASTER\data\</p> <p>Means that the *.aud file you chose resides on your computer's C drive (often the main storage area of a computer), in the <b>Aud files</b> folder (or directory), in the <b>Our clinic</b> sub-folder of that folder, the <b>MASTER</b> subfolder of that subfolder, and the <b>data</b> subfolder of that subfolder.</p> |
| Exit command button                | Select (click on) this command button to close this screen and return to the MASTER Menu screen.                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## The Audiogram Screen

### Physiological Audiogram:

|                   |                    |                        |                 |                            |                 |
|-------------------|--------------------|------------------------|-----------------|----------------------------|-----------------|
| Last Name:<br>any | First Name:<br>ONE | Birth Date:<br>6-11-92 | Gender:<br>MALE | Transducer used:<br>Insert | PRINT AUDIOGRAM |
|-------------------|--------------------|------------------------|-----------------|----------------------------|-----------------|

Left Ear Audiogram

Right Ear Audiogram

|                                                           |                                                |                                                |                                                |                                                |                                                |
|-----------------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| LEFT                                                      | RIGHT                                          | LEFT                                           | RIGHT                                          | LEFT                                           | RIGHT                                          |
| <input checked="" type="checkbox"/> AC Threshold          | <input type="checkbox"/> AC Threshold          | <input type="checkbox"/> BC Threshold          | <input type="checkbox"/> BC Threshold          | <input type="checkbox"/> Sound Field Threshold | <input type="checkbox"/> Sound Field Threshold |
| <input checked="" type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than |
| <input checked="" type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  |

The Audiogram screen presents graphic audiograms for the patient's left ear, right ear, or both. This screen lets you view the data that you entered as HL thresholds from the Test Statistics screen. Data appears color coded with blue used for left ear data and red used for right ear data. The symbol key at the bottom of the display describes the meaning of the symbol. Frequency displays on the x axis; intensity displays on the y axis. The screen consists of graphic displays, five read-only fields, and two command buttons. To reach this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Load Demographics and Protocols command button.  
The Patient Information screen appears.
3. Complete the Patient Information Screen and subsequent screens.  
See the [How to run a new test](#) section of this document.

The illustration shows the Audiogram screen. The table lists and describes its components.



## DESCRIPTIONS: OPERATING SCREENS

### Physiological Audiogram:

|                                                                             |                                                                              |                                                                                  |                                                                           |                                                                                       |                                                                                                  |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Last Name:<br><div style="border: 1px solid black; padding: 2px;">any</div> | First Name:<br><div style="border: 1px solid black; padding: 2px;">ONE</div> | Birth Date:<br><div style="border: 1px solid black; padding: 2px;">6-11-02</div> | Gender:<br><div style="border: 1px solid black; padding: 2px;">MALE</div> | Transducer used:<br><div style="border: 1px solid black; padding: 2px;">Inserts</div> | <div style="border: 1px solid black; padding: 2px; display: inline-block;">PRINT AUDIOGRAM</div> |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|

**Left Ear Audiogram**

**Right Ear Audiogram**

|                                                           |                                                |                                                |                                                |                                                |                                                |
|-----------------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| LEFT                                                      | MID                                            | LEFT                                           | RIGHT                                          | LEFT                                           | RIGHT                                          |
| <input checked="" type="checkbox"/> AC Threshold          | <input type="checkbox"/> AC Threshold          | <input type="checkbox"/> BC Threshold          | <input type="checkbox"/> BC Threshold          | <input type="checkbox"/> Sound Field Threshold | <input type="checkbox"/> Sound Field Threshold |
| <input checked="" type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than | <input type="checkbox"/> Threshold better than |
| <input checked="" type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  | <input type="checkbox"/> Threshold worse than  |

EXIT

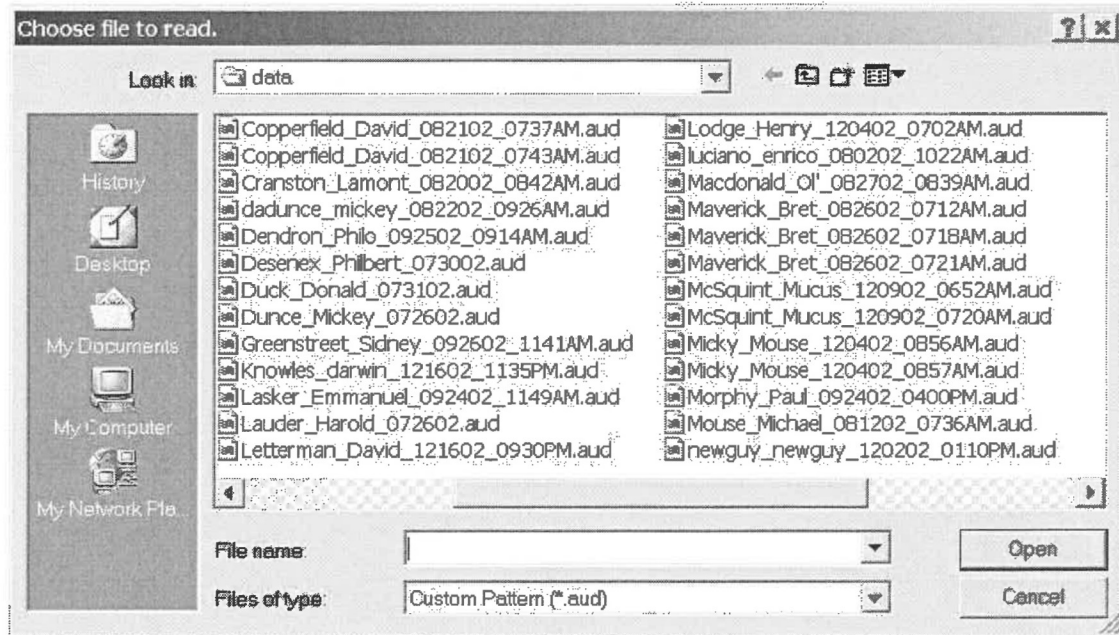
**The Audiogram screen**

| Component                      | Description                                                                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Name field                | This read-only field holds the surname (that is, the last name) of the patient. It gets its content from the name the user enters in the Patient Information screen. |
| First Name field               | This read-only field holds the first name of the patient. It gets its content from the name the user enters in the Patient Information screen.                       |
| Birthdate field                | This read-only field holds the birthdate. It gets its format and its content from the date the user enters in the Patient Information screen.                        |
| Gender field                   | This read-only field holds the sex of the patient. It gets its content from the gender that the user selected for the patient in the Patient Information screen.     |
| Transducer Used field          | This field displays the transducer used for the test.                                                                                                                |
| Print Audiogram command button | Select (click on) this command button to send the audiogram to your system's printer.                                                                                |
| Exit command button            | Select (click on) this command button and the MASTER program returns to the MASTER Menu screen.                                                                      |



## DESCRIPTIONS: OTHER OPERATING SCREENS

### Choose file to read ('Open') dialog box



This standard, Windows™ dialog box appears whenever you use the MASTER system to open a data file. The Microsoft® corporation has thoroughly documented dialog boxes of this type. For descriptions and step-by-step operating instructions, please consult the documentation that came with your Windows™ operating system.

## Next Hearing Level selection box

Please select the next stimulus intensity.  
If the conditions are right, please select your preference for masking.  
If you choose to mask, be sure that the correct transducer is securely placed on the ear you wish to mask.

**Stimulus Intensity**

**Masking Intensity**

☐ Do not mask

☐ Set masking level to  dB HL

☒ Set and maintain masking level at  dB relative to the stimulus level

**Masking Transducer**

☒ Insert Earphone

☐ Ear Muffs

☐ Headphones

This selection box appears whenever you select the Change Intensity button on the Main Test screen (see the [Using the Main Test screen](#) section of this document for details). With this tool, you can begin data collection again during a test session with a new intensity. The illustration shows a Next Hearing Level selection box. The table lists and describes its components.

**Next Hearing Level Selection Box**

| Component                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stimulus Intensity field | <p>This data-entry/selection field lets you choose the hearing level (HL) that you want. You can type the value directly into this field or use the spin buttons to increment (up arrow) or decrement (down arrow) to the value.</p> <p><b>NOTE: The Higher selection notification appears if High Intensity considerations are available. For important safety information see the <a href="#">Handling High and Maximum Intensity conditions</a> section of this document.</b></p> |

## DESCRIPTIONS: OTHER OPERATING SCREENS

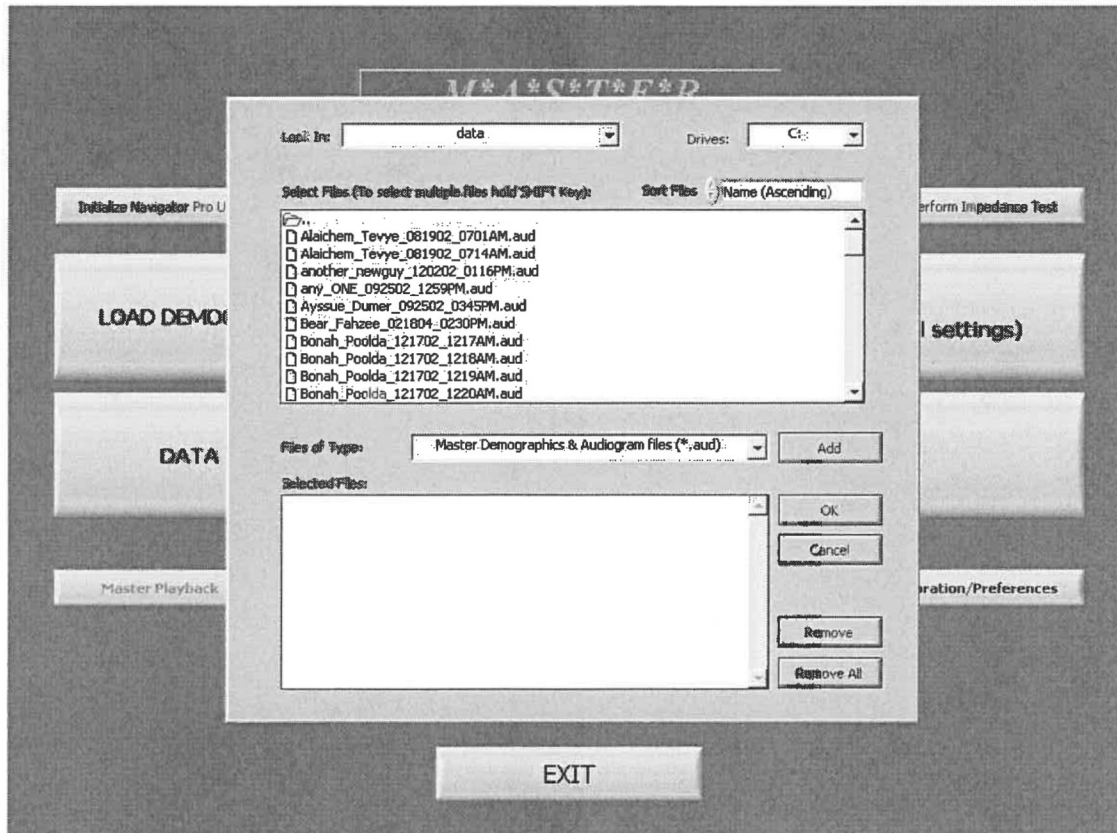
| Component                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Masking Intensity controls       | <p>These controls are active when you select a single ear for collection on the Test Parameters screen. Controls include:</p> <p><b>Do not mask radio button:</b> Select (click on) this radio button (bullet appears) and the program uses no mask on the signal.</p> <p><b>Set masking level to radio button:</b> Select (click on) this radio button (bullet appears) to activate its setting field. With this button active, the program uses the masking intensity that appears in that field.</p> <p><b>Level setting field:</b> This data entry field lets you define the masking intensity that you want to use. Once you activate the field by selecting the <b>Set masking level to radio button</b>, you can type the intensity you want directly into the field or use the spin buttons to increment (up arrow) or decrement (down arrow) to the intensity you want.</p> <p><b>Set and maintain masking level at radio button:</b> Select (click on) this radio button (bullet appears) to activate its setting field. With this button active, the program sets and maintains the masking intensity that appears in that field per the stimulus level.</p> <p><b>Level setting field:</b> This data entry field lets you define the masking intensity that you want to use over a series of stimuli. Once you activate the field by selecting the <b>Set and maintain masking level at radio button</b>, you can type the intensity you want directly into the field or use the spin buttons to increment (up arrow) or decrement (down arrow) to the intensity you want. The program then maintains that masking level no matter what stimulus level the collection uses.</p> |
| Masking Transducer radio buttons | <p>These radio buttons let you select the type of transducer that you want to use for your next hearing collection. Choices here include Insert earphones, Ear Muffins, or headphones.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## Warning messages

Warning messages and other informational displays may appear at any time during the operation of the system. The illustration shows some sample messages. Always read these messages thoroughly and respond to them as directed. If questions or difficulties arise, stop the test immediately and make contact with Bio-logic Systems Corp. Customer Service at 1-800-272-8075.



## The Multiple File Access dialog box



The MASTER program uses the Multiple File Access dialog box to let you gain access to multiple files or tests. You can then display those files or tests through a set of Multiple File Statistics tabs. To reach this dialog box:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the **Multiple file access** command button.  
The Multiple File Access dialog box appears.

The illustration shows a sample Multiple File Access dialog box. The table lists and describes its components.

## DESCRIPTIONS: OTHER OPERATING SCREENS



| Component                                                                                                                                                                                                                                                                                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Look in field                                                                                                                                                                                                                                                                                                    | Select (click on) the down arrow in this field to get a list of locations where the system can find *.aud files. You can then select the location you want from that list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                           |
| Drives field                                                                                                                                                                                                                                                                                                     | Select (click on) the down arrow in this field to get a list of the drives available to the system. You can then select the drive you want from the list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                           |
| Select Files list                                                                                                                                                                                                                                                                                                | This area of the dialog box lists the files that appear in the drive and directory (or folder) you specify with the <b>Look in field</b> and the <b>Drive field</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                           |
| Sort Files field and spin button                                                                                                                                                                                                                                                                                 | <p>This field lets you specify a sort order for the files that appear in the Select Files list. Click on the spin buttons next to this field to choose among these sort orders:</p> <table border="0"> <tr> <td> <p><b>Name (Ascending):</b> This sort order lists the files according to patient name. Names appear in alphabetical order from A to Z.</p> <p><b>Date (Ascending):</b> This sort order lists the files according to the date when the test was run. Files appear chronologically from oldest to most recent.</p> </td><td> <p><b>Name (Descending):</b> This sort order lists the files according to patient name. Names appear in reverse alphabetical order from Z to A.</p> <p><b>Date (Descending):</b> This sort order lists the files according to the date when the test was run. Files appear in reverse chronological order from most recent to oldest.</p> </td></tr> </table> | <p><b>Name (Ascending):</b> This sort order lists the files according to patient name. Names appear in alphabetical order from A to Z.</p> <p><b>Date (Ascending):</b> This sort order lists the files according to the date when the test was run. Files appear chronologically from oldest to most recent.</p> | <p><b>Name (Descending):</b> This sort order lists the files according to patient name. Names appear in reverse alphabetical order from Z to A.</p> <p><b>Date (Descending):</b> This sort order lists the files according to the date when the test was run. Files appear in reverse chronological order from most recent to oldest.</p> |
| <p><b>Name (Ascending):</b> This sort order lists the files according to patient name. Names appear in alphabetical order from A to Z.</p> <p><b>Date (Ascending):</b> This sort order lists the files according to the date when the test was run. Files appear chronologically from oldest to most recent.</p> | <p><b>Name (Descending):</b> This sort order lists the files according to patient name. Names appear in reverse alphabetical order from Z to A.</p> <p><b>Date (Descending):</b> This sort order lists the files according to the date when the test was run. Files appear in reverse chronological order from most recent to oldest.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                           |

# DESCRIPTIONS: OTHER OPERATING SCREENS

| Component           | Description                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Files of Type field | This field is under development. Currently, the only option available is MASTER Demographics & Audiogram files.                                                                                   |                                                                                                                                                                                                                                                                                                                                         |
| Selected Files list | This area of the dialog box is a template for the files that the user selects from the <b>Select Files</b> list. You can add or remove files from this list by using the <b>Command Buttons</b> . |                                                                                                                                                                                                                                                                                                                                         |
| Command buttons     | These buttons perform various functions for the Multiple File Access dialog box. They include:                                                                                                    |                                                                                                                                                                                                                                                                                                                                         |
|                     | Add                                                                                                                                                                                               | This command button works with the files in the Select Files list. Select (click on) one or more of the files in that list and click on the Add command button. The program adds these files to the Selected Files list. Users can also double click on a file in the "Select File" list to add that file to the "Selected Files" list. |
|                     | OK                                                                                                                                                                                                | Select (click on) this command button to close the Multiple File Access dialog box and launch the Multiple file Statistics tabs with the files in the <b>Selected Files</b> list.                                                                                                                                                       |
|                     | Cancel                                                                                                                                                                                            | Select (click on) this command button to close the Multiple File Access dialog box without launching the Multiple file Statistics tabs.                                                                                                                                                                                                 |
|                     | Remove                                                                                                                                                                                            | This command button works with the fields in the Select Files list. Select (click on) one or more of the files in that list and click on the Remove command button. The program removes these files from the Selected Files list.                                                                                                       |
|                     | Remove All                                                                                                                                                                                        | This command button works with the fields in the Select Files list. Select (click on) the Remove All command button and the program removes all files from the Selected Files list.                                                                                                                                                     |



## Multiple File Statistics tabs

The screenshot displays the 'Multiple File Statistics tabs' interface. At the top, there are three tabs: 'Air Conduction', 'Bone Conduction', and 'Sound Field Speakers'. Below these tabs are six sub-tabs labeled 'Test 1' through 'Test 6'. The main area is divided into two columns for 'Left Ear' and 'Right Ear'. Each column contains three sub-sections: 'Frequencies (AC1)', 'Noise (L) (AC1)', and 'Sweeps (L) (AC1)' for the left ear, and 'Frequencies (AC1)', 'Noise (R) (AC1)', and 'Sweeps (R) (AC1)' for the right ear. Each of these sub-sections contains a grid of 18 rows and 3 columns. Below the grids, there are fields for 'Test Date: 9/24/2002', 'Last Name: capablanca', and 'First Name: Jose'. At the bottom, there is an 'Air Conduction Hearing Threshold Table' with columns for frequencies (500, 750, 1000, 1500, 2000, 3000, 4000, 6000, 8000) and rows for 'Left Ear' and 'Right Ear'.

|           | 500 | 750 | 1000 | 1500 | 2000 | 3000 | 4000 | 6000 | 8000 |
|-----------|-----|-----|------|------|------|------|------|------|------|
| Left Ear  |     |     |      |      |      |      |      |      |      |
| Right Ear |     |     |      |      |      |      |      |      |      |

The Multiple Files Statistics tabs let you see and print audiograms for as many as 18 files of three separate types (air conduction, bone conduction, or sound field). To launch this tab set, follow these steps:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the **Multiple file access** command button.  
The Multiple File Access dialog box appears.
3. Use the Multiple File Access dialog box to select the files or tests you want to process.  
See [How to use the Multiple File Access dialog box](#) section of this document.
4. Select (click on) the OK command button on the Multiple File Access dialog box.

The illustration shows a sample the Multiple Files Statistics tabs. The table lists and describes its components.

### Multiple Files Statistics tabs

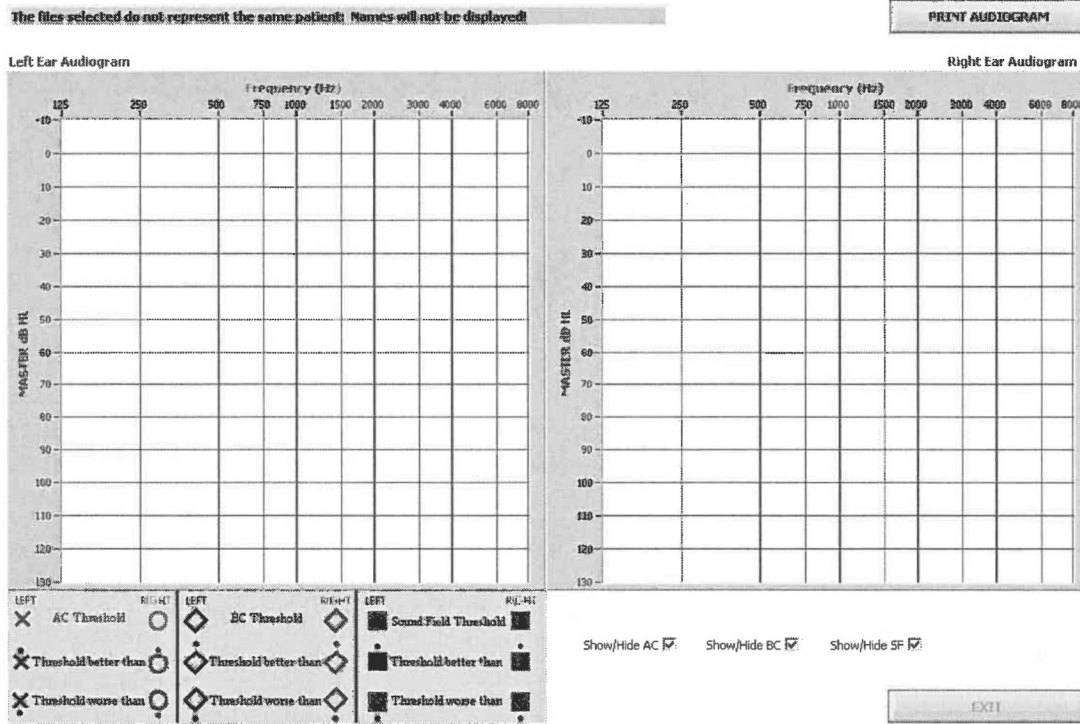
| Component      | Description                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| File Type Tabs | Each tab can support as many as six separate tests or files. Types include Air Conduction, Bone Conduction, and Sound Field Speakers. |



| Component                                                                                                                                                                                                                                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Audiogram adjustment radio buttons                                                                                                                                                                                                                                                                              | <p>Select (click on) one of these radio buttons to adjust audiogram plots by standard correction factors. You set these correction factors in the Physiological-Behavioral Correction tab of the Calibration Preferences tab set. You can apply different adjustment criteria to the different types of files; that is, you can select to Use correction for Air Conduction files but select to Ignore Correction for Bone Conduction files. Adjustment choices include:</p> <table> <tr> <td> <p><b>Use correction:</b> Click on this radio button and the program uses the correction you set on the Physiological-Behavioral Correction tab.</p> <p><b>Ignore correction:</b> Click on this radio button and the program ignores the correction you set on the Physiological-Behavioral Correction tab.</p> </td><td> <p><b>Better than:</b> Click on this radio button when assess the hearing threshold level as better than the value in the HL table. The Audiogram uses the better than symbol.</p> <p><b>Worse than:</b> Click on this radio button when assess the hearing threshold level as worse than the value in the HL table. The Audiogram uses the worse than symbol.</p> </td></tr> </table> | <p><b>Use correction:</b> Click on this radio button and the program uses the correction you set on the Physiological-Behavioral Correction tab.</p> <p><b>Ignore correction:</b> Click on this radio button and the program ignores the correction you set on the Physiological-Behavioral Correction tab.</p> | <p><b>Better than:</b> Click on this radio button when assess the hearing threshold level as better than the value in the HL table. The Audiogram uses the better than symbol.</p> <p><b>Worse than:</b> Click on this radio button when assess the hearing threshold level as worse than the value in the HL table. The Audiogram uses the worse than symbol.</p> |
| <p><b>Use correction:</b> Click on this radio button and the program uses the correction you set on the Physiological-Behavioral Correction tab.</p> <p><b>Ignore correction:</b> Click on this radio button and the program ignores the correction you set on the Physiological-Behavioral Correction tab.</p> | <p><b>Better than:</b> Click on this radio button when assess the hearing threshold level as better than the value in the HL table. The Audiogram uses the better than symbol.</p> <p><b>Worse than:</b> Click on this radio button when assess the hearing threshold level as worse than the value in the HL table. The Audiogram uses the worse than symbol.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| Generate Selected Graphs command button                                                                                                                                                                                                                                                                         | Select (click on) this command button and the program closes the tab set and generates an audiogram for the files and tests you have selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| Exit command button                                                                                                                                                                                                                                                                                             | Select (click on) this command button and the program closes the tab set without processing any files and returns to the MASTER main screen.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| Test tabs                                                                                                                                                                                                                                                                                                       | Each of these six tabs can hold test results for one type of test file. Descriptions of the data fields on these tabs appear in the Demographics and Audiogram screen section of this document.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| Left and Right Ear Frequencies fields                                                                                                                                                                                                                                                                           | These sets of as many as 4 text boxes contain read-only data that display the carrier frequency of the test(s) for the left ear, the right ear, or both.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| HL fields                                                                                                                                                                                                                                                                                                       | Any intensity tested during the session appears in this read-only table.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |
| Text Boxes                                                                                                                                                                                                                                                                                                      | The Text Boxes in the Test Statistics screen form tables are populated by the *.aud file that you open with the open .aud file command button. These tables start at the top of the screen. Each contains a header row with as many as four (4) frequencies and columns with 15 rows for the display of the HL test level. The data results are a read-only F statistical value and appear at the appropriate frequency and HL level. Background color of the cell matches the final color of the color plot achieved during collection. Double-clicking a cell in a data table populates the Hearing Threshold table with the corresponding HL value. The Audiogram adjustment radio buttons determine the value that appears in the Hearing Threshold table.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                    |

## Multi-file Audiogram

### Physiological Audiogram:



This Audiogram screen presents graphic audiograms for as many as 18 different tests. Similar to the standard Audiogram screen, this screen lets you view the data that you entered as HL thresholds from the Test Statistics screen. Data appears color coded with blue used for left ear data and red used for right ear data. The symbol key at the bottom of the display describes the meaning of the symbol. Frequency displays on the x axis; intensity displays on the y axis. The screen consists of graphic displays, five read-only fields, two command buttons, and "Show/Hide" checkboxes.

The illustration shows the Multiple File Audiogram screen. The table lists and describes its components.

**Note: Most components and descriptions in this table are identical to those that appear in the Audiogram screen section of this document. We repeat them here for your convenience.**

**The Multiple File Audiogram screen**

| Component                                                                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Note: The field at the top of this screen displays the patients name if all the files used to generate the audiogram apply to the sanme patient.</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Print Audiogram command button                                                                                                                          | Select (click on) this command button to send the audiogram to your system's printer.                                                                                                                                                                                                                                                                                                                                                                                                          |
| "Show/Hide" checkboxes                                                                                                                                  | <p>These checkboxes determine the data that appears on the Audiogram. Select (click on) these checkboxes:</p> <ul style="list-style-type: none"> <li>—Until a checkmark appears to display the related data type.</li> <li>—Until no checkmark appears to hide the related data type.</li> </ul> <p>Data types include:</p> <ul style="list-style-type: none"> <li>—Show/Hide AC (air conduction)</li> <li>—Show/Hide BC (bone conduction)</li> <li>—Show/Hide SF (sound frequency)</li> </ul> |
| Exit command button                                                                                                                                     | Select (click on) this command button and the MASTER program returns to the MASTER Menu screen.                                                                                                                                                                                                                                                                                                                                                                                                |

## Calibration Preferences Tabs

HL-SPL Calibration   Physiological-Behavioral Correction   High Intensity timeout   Max # of sweeps   F-value Color legend

**Master HL-SPL Calibration Table**

|             | Insert Earphones | TDH-39 | Ear Muffins | Bone Osc. | Free Field |
|-------------|------------------|--------|-------------|-----------|------------|
| 500Hz       | 11               | 14     | 36          | 51        |            |
| 750Hz       | 9                | 12     | 34          | 55        |            |
| 1000Hz      | 7                | 9      | 32          | 55        |            |
| 1500Hz      | 6                | 9      | 30          | 51        |            |
| 2000Hz      | 9                | 12     | 32          | 55        |            |
| 3000Hz      | 10               | 4      | 38          | 55        |            |
| 4000Hz      | 10               | 13     | 41          | 55        |            |
| 6000Hz      | 29               | 12     | 60          | 55        |            |
| 8000Hz      | 48               | 37     | 80          | 65        |            |
| White Noise | 27               | 27     | 52          |           |            |

Restore Manufacturer Settings

Save & Exit   Restore last values saved   Cancel (Disregard Changes)

These tabs let users setup parameters for various calibration procedures. The set of tabs consists of:

- An HL-SPL Calibration tab
- A Physiologic-Behavioral Correction tab
- A High Intensity Time Out tab
- A Maximum # Sweeps tab
- An F-Value Color Legend tab

You reach this set of tabs as follows:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Calibration/Preferences command button.



## DESCRIPTIONS: OTHER OPERATING SCREENS

The tab set has common command buttons that apply to each tab. The illustration shows these command buttons. The table lists and describes them.

### Calibration Preferences tabs: Common Command Buttons

| Command button                            | Description                                                                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Save and exit Command Button              | Select (click on) this command button to save any changes you have made to the settings for your transducers and to close the Calibration/Corrections tables screen. |
| Restore Last Values Saved command button  | Select (click on) this command button to restore values saved before any changes to any of the Calibration Preferences tabs.                                         |
| Cancel (Disregard changes) Command Button | Select (click on) this command button to close the Calibration/Corrections tables screen without making any changes.                                                 |

## The HL-SPL Calibration tab

HL-SPL Calibration

|             | Insert Earphones | TDH-39 | Ear Muffins | Bone Osc. | Free Field |
|-------------|------------------|--------|-------------|-----------|------------|
| 500Hz       | 11               | 14     | 36          | 51        |            |
| 750Hz       | 9                | 12     | 34          | 55        |            |
| 1000Hz      | 7                | 9      | 32          | 55        |            |
| 1500Hz      | 6                | 9      | 30          | 51        |            |
| 2000Hz      | 9                | 12     | 32          | 55        |            |
| 3000Hz      | 10               | 4      | 38          | 55        |            |
| 4000Hz      | 10               | 13     | 41          | 55        |            |
| 6000Hz      | 29               | 12     | 60          | 55        |            |
| 8000Hz      | 48               | 37     | 80          | 65        |            |
| White Noise | 27               | 27     | 52          |           |            |

Restore Manufacturer Settings

Save & Exit      Restore last values saved      Cancel (Disregard Changes)

This is one of the tabs in the Calibration/Preferences tab set. With it, you can set up values for transducer calibration. Its components include:

### The HL-SPL Calibration tab

| Component                                      | Description                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transducer Settings Columns                    | <p>These columns list the corrections for each transducer per frequency. Users can change these settings to fit their needs. Transducers available are:</p> <p>Insert earphones<br/> TDH-39 headphones<br/> Ear Muffins (disposable ear coupler) used with ER-3 inserts<br/> Bone Oscillator<br/> Free field</p> |
| Restore Manufacturer's Settings Command Button | <p>Select (click on) this command button to restore the manufacturer's original settings for the transducers in your system. Other values you may have entered will be eliminated.</p>                                                                                                                           |

## The Physiological-Behavioral Correction tab

Physiological-Behavioral Correction

**Master Physiological-Behavioral Correction Table**

|         | 500Hz | 750Hz | 1000Hz | 1500Hz | 2000Hz | 3000Hz | 4000Hz | 6000Hz | 8000Hz |
|---------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| 0-9     | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 10-19   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 20-29   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 30-39   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 40-49   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 50-59   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 60-69   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 70-79   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 80-89   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 90-99   | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 100-109 | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 110-119 | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |
| 120-130 | -10   | -10   | -10    | -10    | -10    | -10    | -10    | -10    | -10    |

Restore Manufacturer Settings

This is one of the tabs in the Calibration/Preferences tab set. With it, you can set up the decibel values that generate the audiogram. Its components include:

### The Physiological-Behavioral Correction tab

| Component                                      | Description                                                                                                                                                   |                            |                  |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|
| Frequency column                               | These columns list the physiological and behavioral corrections that apply to the frequencies that are available with the MASTER system. Frequencies include: |                            |                  |
|                                                | 500Hz<br>750Hz<br>1000Hz<br>1500Hz                                                                                                                            | 2000Hz<br>3000Hz<br>4000Hz | 6000Hz<br>8000Hz |
| Restore Manufacturer's Settings Command Button | Select (click on) this command button to restore the manufacturer's original settings for this feature. Other values you may have entered will be eliminated. |                            |                  |

## The High Intensity Time Out tab

High Intensity timeout

Prolonged high Intensity stimulation can damage hearing. You can enable a maximum duration that the stimulus will remain on and a time-out duration before the stimulus and averaging resume automatically. Disabling these settings will cause the stimulus to continue until the recording is terminated manually or based on the stopping criteria.

| Enable                   | Intensity (dB HL) | Max. Time On (min)   | Time Off (min)       |                                                                                                                                                                                       |
|--------------------------|-------------------|----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | 120-129           | <input type="text"/> | <input type="text"/> | <b>Note:</b><br>To enable a specific time ON/OFF range, enter desired values into the appropriate areas and only then check corresponding ENABLE control which will save these values |
| <input type="checkbox"/> | 110-119           | <input type="text"/> | <input type="text"/> |                                                                                                                                                                                       |
| <input type="checkbox"/> | 100-109           | <input type="text"/> | <input type="text"/> |                                                                                                                                                                                       |
| <input type="checkbox"/> | 90-99             | <input type="text"/> | <input type="text"/> |                                                                                                                                                                                       |
| <input type="checkbox"/> | 80-89             | <input type="text"/> | <input type="text"/> |                                                                                                                                                                                       |
| <input type="checkbox"/> | 70-79             | <input type="text"/> | <input type="text"/> |                                                                                                                                                                                       |

Restore Manufacturer Settings

This is one of the tabs in the Calibration/Preferences tab set. This tab lets you limit the duration of the patient's exposure to high intensity stimulation. With it, you can set time intervals in 0.5 minute increments. These intervals define how long a stimulus (and data collection) continues uninterrupted ("Time On") until it automatically ramps off to a "quiet" time ("Time Off"). After the quiet time—during which no data is being averaged—the stimulus ramps up again and data collection automatically resumes where it left off. This cycle continues until the user stops collection or until the program reaches the maximum number of sweeps.

To enable this feature for intensities above 70 dB HL, enter values in both columns and then check the checkbox in front of the intensity range. The illustration shows the High Intensity Time Out tab. The table lists and describes its components.



**The High Intensity Time Out tab**

| Component                                      | Description                                                                                                                                                                                                                                                                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable checkboxes                              | <p>Select (click on) these checkboxes to enable (checkmark appears) or disable (no checkmark) the timeout settings you want for each intensity.</p> <p><b>Note: You must type in the timeout setting you want before you enable a checkbox. Otherwise, the MASTER program prompts you to do so.</b></p> |
| Intensity (dB HL) column                       | This column lists the intensity of the various stimuli you can select.                                                                                                                                                                                                                                  |
| Max Time On (min) field                        | This data entry field lets you specify how long the program delivers the stimulus (that is, how long the remains on). This setting is in minutes.                                                                                                                                                       |
| Time Off (min) field                           | This data entry field lets you specify how long the stimulus remains off before the program automatically restarts delivering it (this setting is in minutes).                                                                                                                                          |
| Restore Manufacturer's Settings Command Button | Select (click on) this command button to restore the manufacturer's original settings for this feature. Other values you may have entered will be eliminated.                                                                                                                                           |

## The Maximum # Sweeps tab

| Intensity range | Maximum number of sweeps |
|-----------------|--------------------------|
| 0-9             | 50                       |
| 10-19           | 45                       |
| 20-29           | 40                       |
| 30-39           | 32                       |
| 40-49           | 32                       |
| 50-59           | 32                       |
| 60-69           | 32                       |
| 70-79           | 32                       |
| 80-89           | 18                       |
| 90-99           | 12                       |
| 100-109         | 10                       |
| 110-119         | 10                       |
| >119            | 10                       |

Restore Manufacturer Settings

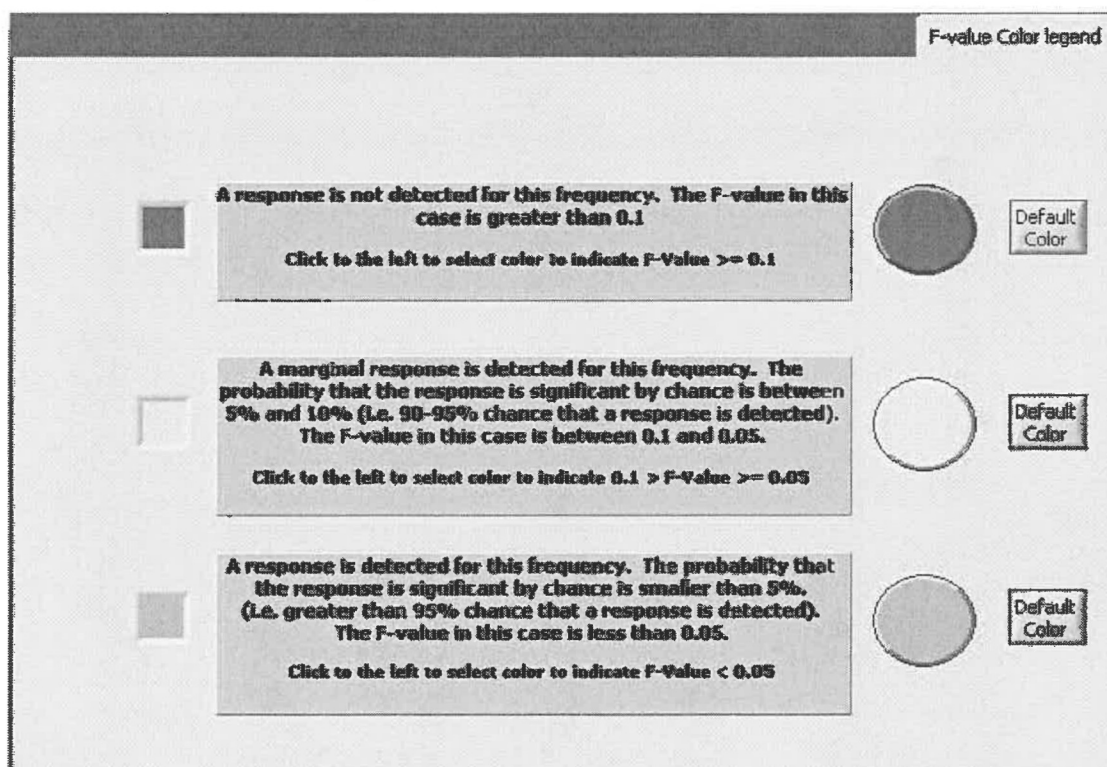
This is one of the tabs in the Calibration/Preferences tab set. This feature lets you define the maximum number of sweeps that the program collects for 10 dB intensity ranges when the user does not intervene to Stop, Change Intensity, or Accept Results. Because more sweeps are generally needed for lower intensity levels, this feature lets you automatically collect more sweeps for lower and lower intensity levels.

The illustration shows the Maximum # Sweeps tab. The table lists and describes its components.

**The Maximum # Sweeps tab**

| Component                                      | Description                                                                                                                                                   |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intensity range column                         | This read-only list shows the various intensity ranges available for the program's stimuli.                                                                   |
| Maximum Number of Sweeps column                | These data entry fields let you specify the maximum number of sweeps that the MASTER program performs at each intensity range.                                |
| Restore Manufacturer's Settings Command Button | Select (click on) this command button to restore the manufacturer's original settings for this feature. Other values you may have entered will be eliminated. |

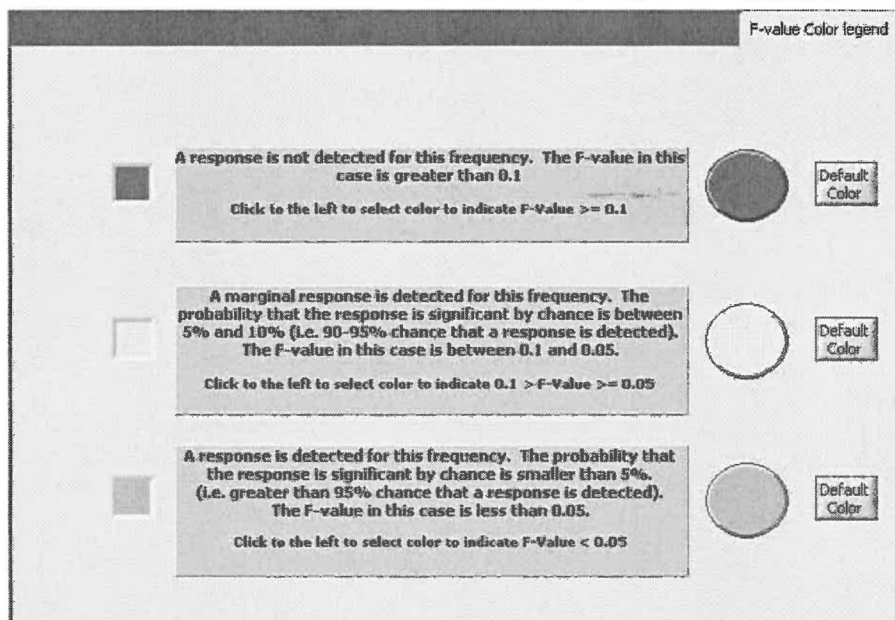
## The F-value Color Legend tab



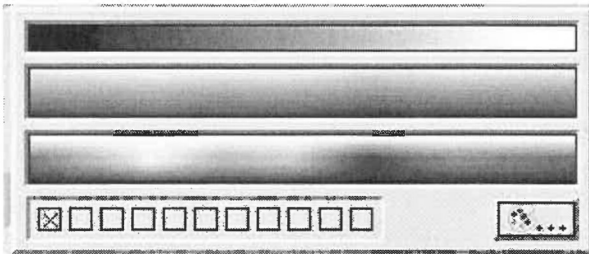
This is one of the tabs in the Calibration/Preferences tab set. This tab lets you define the color associated with the three different levels of F-values. Be aware that these colors affect the color of the circle on the data collection screen as well as the background color of the cells in the history and statistics tables. However, in the history and statistics tables, an F-value associated with no response always appears on a white background regardless of the color that you choose here.

The illustration shows the F-Value Color Legend tab. The table lists and describes its components.

## DESCRIPTIONS: OTHER OPERATING SCREENS



**The F-Value Color Legend tab**

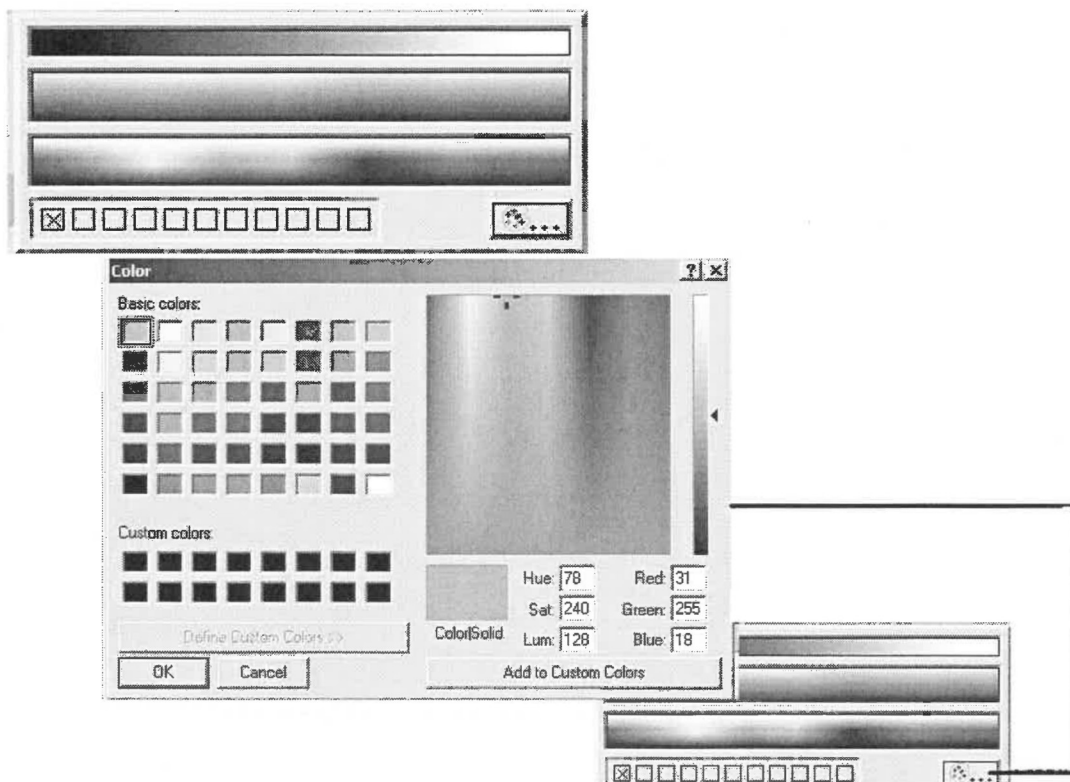
| Component             | Description                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Color selection boxes | <p>Select (click on) any of these boxes to launch an interactive display that lets you choose the color you want for each F-Value. This display looks like this:</p>  <p>For more information about this display, see <a href="#">The Set F-Value Colors dialog box</a> section of this document.</p> |
| F-Value Descriptions  | <p>These read-only display fields contain information about the response the program detects for each frequency.</p>                                                                                                                                                                                                                                                                      |



**DESCRIPTIONS: OTHER OPERATING SCREENS**

| <b>Component</b>             | <b>Description</b>                                                                               |
|------------------------------|--------------------------------------------------------------------------------------------------|
| Oval color tiles             | These items show a sample of the color you select with the Set F-Value Colors dialog box.        |
| Default Color command button | Select (click on) this command button to assign system default colors to its respective F-value. |

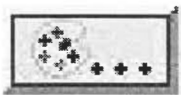
## The Set F-Value Colors dialog box



This dialog box appears when you click on a Color selection box from the F-Value Color Legend tab. You can use this feature to set different colors for each of the three different levels of F-values. The choices you make here affect the color of the circle on the data collection screen as well as the background color of the cells in the history and statistics tables. However, in the history and statistics tables, an F-value associated with no response always appears on a white background.

The illustration shows the Set F-Value Colors dialog box. The table lists and describes its components.

**The Set F-Value Colors dialog box**

| Component                                                                                                          | Description                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Color bands                                                                                                        | These interactive bands show graduating properties of color such as tint, hue, and shade. Move your mouse cursor across them to adjust the color that you want to assign to the F-Value you selected.                                                                                                                                  |
| Custom color command button<br> | Select (click on) this command button to launch a dialog box that gives you more control over color.<br><br><b>Note: The Microsoft Corporation® has thoroughly documented how to use dialog boxes of this type. For more information, consult the documentation that accompanies your Windows program (usually on the Windows CD).</b> |

# **Protocols**

The MASTER software includes pre-set screening protocols used in screening programs to detect hearing problems. The list below shows all of the protocols currently available for use with the MASTER system. LEFT implies left ear protocols; RIGHT implies right ear protocols.

|   |                              |                               |
|---|------------------------------|-------------------------------|
| 1 | LEFT: 500, 1000, 2000, 4000  | RIGHT: 500, 1000, 2000, 4000  |
| 2 | LEFT: 750, 1500, 3,000, 6000 | RIGHT: 750, 1500, 3,000, 6000 |
| 3 | LEFT: 1000, 2000, 4000, 8000 | RIGHT: 1000, 2000, 4000, 8000 |
| 4 | LEFT: 750, 1500, 3,000, 6000 | RIGHT: 500, 1000, 2000, 4000  |
| 5 | LEFT: 750, 1500, 3,000, 6000 | RIGHT: 1000, 2000, 4000, 8000 |
| 6 | LEFT: 1000, 2000, 4000, 8000 | RIGHT: 500, 1000, 2000, 4000  |
| 7 | LEFT: 1000, 2000, 4000, 8000 | RIGHT: 750, 1500, 3,000, 6000 |
| 8 | LEFT: 500, 1000, 2000, 4000  | RIGHT: 750, 1500, 3,000, 6000 |
| 9 | LEFT: 500, 1000, 2000, 4000  | RIGHT: 1000, 2000, 4000, 8000 |

## Notes

Use this page for your own notes.



# OPERATING PROCEDURES

## INSTALLING THE MASTER

As part of the purchase price for your MASTER, you are entitled to installation and one training session from your local Bio-logic Systems Corp. representative. Make contact with your local representative when you receive your system to schedule installation and training. If you do not know your local representative, please phone our Customer Support Department at 800-323-8326.



### CAUTION

**This system is intended for use as a medical instrument only. The software installed on this system has been verified and validated for that use as long as no other unintended or unauthorized software is running at the same time. Do not install, download, save, or transfer other programs, software, or data on this equipment without first consulting Bio-logic Systems Corp. Doing so may interfere with the proper operation of this software.**

### *Software Installation*

If you purchased a complete MASTER system, including the computer, then the software is already installed at the time of delivery. However, if you purchased a kit and are using it with a computer that you supplied through a separate purchase, your Bio-logic representative will install the software for you. Refer to the Minimum Computer Specifications Section of this document and verify that your computer meets these minimum specifications. If it does not meet these requirements, your kit may not function properly.

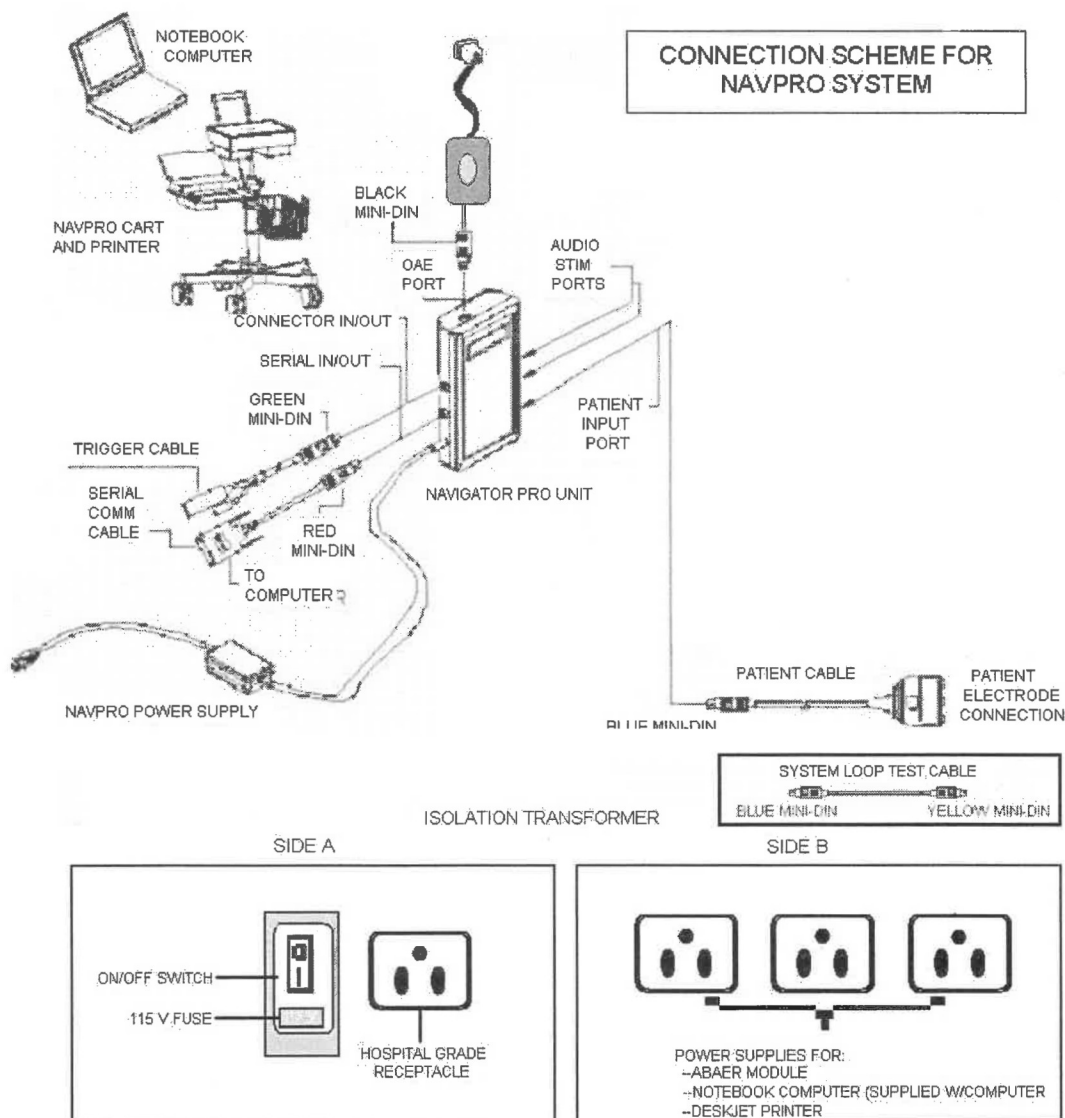
**Note: Bio-logic Systems Corp. is not responsible for resolving incompatibilities between the kit and a computer that does not meet the minimum computer specifications.**

## Hardware Installation



### WARNING

Each of the colored plastic housings on the cables displays arrows that identify the top of the connector. This helps align the cable connector male plug to the female jack on the side of the system module. Careful alignment of the cable plug to the jack is important to reduce the chance of bending the metal pins inside the male connector. You must insert the plugs completely into the corresponding jacks for the system to operate properly. Never twist these connectors during insertion or removal. Twisting the connector in the socket may damage the metal pins and cause communication problems between the system module and the computer. It may also cause other system malfunctions involving stimulus delivery or system recording.

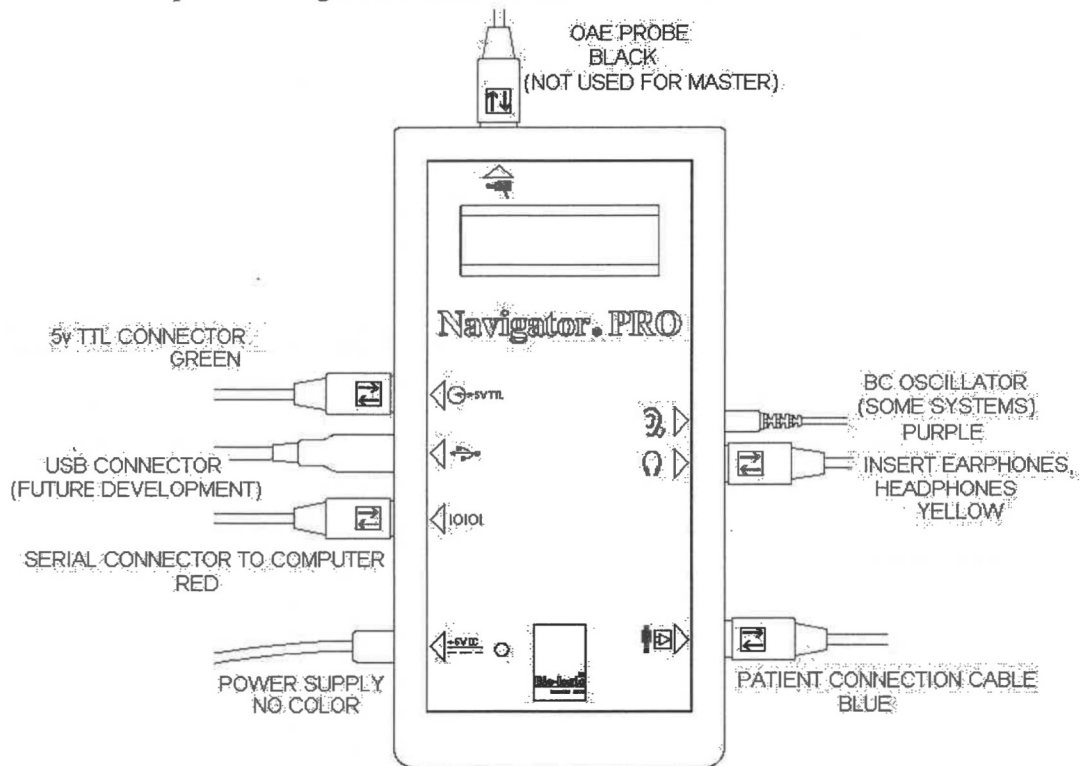




## WARNING

Make sure that any platform, table, cart, or other surface used during the operation, transport, or temporary or permanent storage of the system and its components is adequate, sturdy, and safe. Bio-logic Systems Corp. is not responsible for any injury or damage that may result from inadequate, poorly constructed, or unapproved transports, carts, operating surfaces.

Hardware installation of the MASTER involves connecting several cables to the Navigator® Pro module. Five RS232 female connectors are on three sides of the Navigator® Pro module. Each of these connectors has a different pin configuration. This reduces the risk of plugging the wrong cable into the connector. Additionally, colored rings around the connector sockets on the sides of the Navigator® Pro module match the color of the plastic housing around the RS232 male connector end of the cable.



**Note:** This illustration shows items only for MASTER systems. For other systems, please make contact with Bio-logic Systems Corp. Customer Support at 1-800-272-8075.

The MASTER system is purchased with a choice of the transducer. Your system may have been purchased with insert earphones or, headphones. Depending on your specific purchase, some of the connector jacks on the sides of the Navigator® Pro system will remain unused. For the system to operate, however, connections must be made to the blue (electrode connection cable), red (serial cable) and uncolored power supply connector. Additionally either the yellow or the purple (bone) connector must be used for delivery of the stimulus into the ear.

Once the cable connections are made into the Navigator® Pro module, additional connections must be made to complete the hardware installation. Insert the 9-pin D connector (female) end of the serial cable into the available serial (COM) port of the computer. The location and labeling of the serial port on the computer varies. On a desktop or tower computer, the serial or COM port is typically located on the back with all of the other connectors. On a laptop computer, the serial port may be on either side or on the back. If you purchased the computer from Bio-logic Systems Corp., a small COM PORT or SERIAL PORT label will be adhered adjacent to the connector. If you provided the computer, consult the manual that accompanied the computer to locate the COM or serial port. Rarely, serial ports have a 24-pin D connector rather than a 9-pin connector. When this occurs, you must use a 9-pin to 24-pin female adapter to connect the serial cable to the computer's serial port.



## Patient Preparation

The MASTER test involves placement of recording electrodes on the patient's head. These electrodes record the electrical activity generated by the auditory nervous system that results from presentation of an acoustic stimulus into the ear. The stimulus is delivered to the ear by an earphone that is coupled to the ear with an earplug that is inserted into the ear canal, a headphone, an Ear Muffin coupler placed over an infant's ear, or by the BC oscillator. A starter kit of the disposable supplies that you need to perform a MASTER test comes with the system purchase. Additional disposable sets are available from Bio-logic Systems Corp. These can be ordered by calling the Supplies Department at 1-800-456-5205.

A MASTER test is most successful and fastest when performed on a comfortable, sleeping patient. If the patient is agitated or active, the test may be prolonged or the results may be compromised by a high level of background noise (acoustic or myogenic) in the recording.

### *Electrode application*

The MASTER is a one-channel data collection system that uses three (3) electrodes. The skin at the electrode sites must be prepared to insure a good recording. The recommended electrode sites are the Vertex (active; Ch. 1, Input 1), the nape of the neck (reference; Ch. 1, Input 2), and the shoulder (ground). For the active electrode, you may also use the high forehead or a location just anterior to the fontanel on an infant.

Use an electrode skin preparation pad or a swab coated with Nuprep™ to clean each of the areas. Note that these cleansing materials are slightly abrasive. Once the areas have been cleaned, wait for a few seconds until the area dries and use a gauze pad to remove any residue. Then apply the electrodes to the skin.

The electrodes plug into the patient cable as follows:

Vertex = Channel 1, Input 1

Nape = Channel 1, Input 2

Shoulder = Ground/Common

Electrode impedance should be as low as possible and balanced—preferably all at 5 kOhm or below. If the electrode impedance is high, you should remove the electrode at that site and prep the area again with the skin preparation pad.

### *Ear coupler application*

Proper placement of the ear coupler is important to ensure adequate delivery of the click stimulus to the ear. The coupling to the ear will depend on the type of transducer you are using. Regardless of the transducer, it is important to verify that the placement of the transducer is accurate so that when a right ear test is specified in the program, it is the right ear that is truly receiving the click stimulus. Incorrect placement of the earphones can result in poor quality recordings, increase the chance that a refer result will occur, and result in assigning the test result to the wrong ear.

## Insert earphones

Insert earphones include two transducers, a small box, one for each ear. The cable into the transducers is color-coded to assist in the proper placement of the correct transducer on each ear. The insert earphone with the red cable must be used on the right ear. The insert earphone with the blue cable must be used on the left ear.

The red or blue tubes that come with the insert earphones are not disposable. The red tube couples to the insert earphone with the red cable. The blue tube couples to the insert earphone with the blue cable. The disposable eartip couples to the adapter at the end of the red and blue tube. The tip must be securely inserted into the ear canal following the color-coding scheme of red for the right ear and blue for the left ear. Too superficial of a placement in the ear canal may result in the eartip slipping out of the ear during the test or in poor quality data due to reduction in the stimulus intensity delivered into the ear canal.

## Earphone Compatibility

To achieve accurate output from insert earphones, you must use the tubes, adapters, and disposable tips for the specific inserts that you are using. Alternate pieces sometimes fit onto the inserts, but using non-compatible components can affect the transducer output and accuracy of data. Be sure to use only the accessory components that match your insert earphones per the illustrations below.

ER3 (Etymotic Research)  
Insert Earphones



- #202160 – Replacement plastic tips - (10/pkg. White)
- #202140 – Impedance tip adapter (black) and Red/Blue tubing - (pair)
- #206900 – Ear Muffin™ acoustic tips (white) – (pair)
- #202121 – Pediatric disposable foam tips – black straw (50/pkg)
- #202122 – Adult disposable foam tips – black straw (50/pkg)
- #202123 – Jumbo disposable foam tips – black straw (24/pkg)

Bio-logic  
Insert Earphones



- #202250 – Replacement Red/Blue tubing with gray plastic tip - (pair)
- #202260 – Replacement plastic tips - (10/pkg. Gray)
- #202240 – Impedance tip adapter and tubing – Gray (pair)
- #206920 – Ear Muffin acoustic tip – (pair)
- #202121 – Pediatric disposable foam tips – black straw (50/pkg)
- #202122 – Adult disposable foam tips – black straw (50/pkg)
- #202123 – Jumbo disposable foam tips – black straw (24/pkg)

For more information or to order, call 1-800-456-5205.

**EarMuffs™ (with insert earphones)**

You can also use disposable Ear Muffs™ on the insert earphones as an alternative to eartips. These surround the infant's ear and stick to the skin around the ear via medical grade tape. Use the insert earphone tubes with the grey adapter and insert them into a hole at the top of the foam on the outer surface of the Ear Muffin. Be sure to place the ear muffin connected to the right transducer on the right ear and the ear muffin connected to the left transducer on the left ear.

**Earphones**

Standard TDH39 headphones can be used with the MASTER system but are not recommended for infants. Use of a standard headphone held by hand over the newborn's ear is still practiced in some facilities. This practice increases the possibility of collapsing the infant's ear canal due to the pressure of the headphone. A collapsed ear canal attenuates the stimulus intensity reaching the eardrum and yields results similar to those observed when a conductive hearing loss is present. If earphones are being used despite this, it is important that the correct earphone be placed on the test ear. The right ear headphone displays a red label and the left headphone has a blue label.



## How to run a new test

This section presents illustrated, step-by-step procedures for running a new test with the MASTER program. These procedures consist of:

Starting the MASTER program.

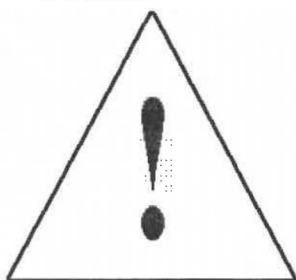
Entering and saving patient information.

Configuring protocols for a test.

Starting the test.

Using the Main Test screen.

Read these procedures carefully. Bio-logic Systems Corp. suggests that you follow them in order whenever you run a test. Should questions or problems arise, stop the test procedure at once and make contact with Bio-logic Systems Corp. Customer Service at 1-800-272-8075.



### CAUTION

**This system is intended for use as a medical instrument only. The software installed on this system has been verified and validated for that use as long as no other unintended or unauthorized software is running at the same time. Do not install, download, save, or transfer other programs, software, or data on this equipment without first consulting Bio-logic Systems Corp. Doing so may interfere with the proper operation of this software.**

## ***Starting the MASTER program***

To load the MASTER application, follow these steps:

1. Activate the computer and wait until the Windows "Desktop" screen appears.
2. Select (click on) the MASTER shortcut icon () to start the program.

Installing the MASTER software places this shortcut icon on the Windows desktop.

### **OR**

3. Select (click on) the Start button on the Windows task bar.

A menu of program items appears.

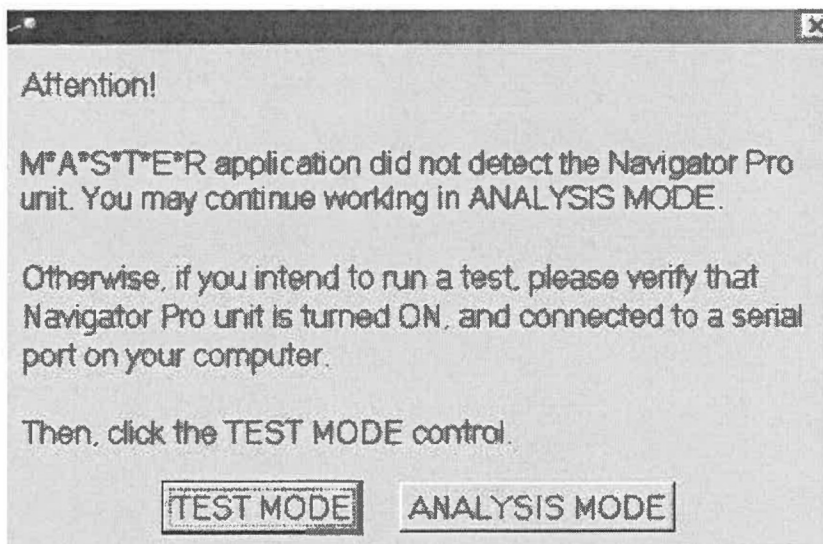
4. Select (click on) the Programs menu item.

A list of the applications on your computer appears.

5. Find and select (click on) the MASTER item.

When the software loads, it searches for associated hardware, displays the first screen of the MASTER program, and initializes the DSP application.

If the MASTER application and its associated hardware cannot communicate, this message appears:



If you intend only to review previously collected data or make changes to setup options, select the ANALYSIS MODE button. The program cannot collect data, but can perform all other functions.

If you intend to collect MASTER data, follow these steps:

1. Verify that the serial cable connects securely to both the Navigator® Pro module and to the serial port of the computer.
2. Make sure that the Navigator® Pro module is powered ON.

When the power is on, a green light appears on the front panel of the Navigator® Pro module. If the module is not powered ON

—Check the cable connection into the power connector on the left side of the Navigator® Pro module.

—Check the connection between the power supply and the power cable.

—Check the plug connection into the wall outlet or the isolation transformer.

3. Select the TEST MODE button in the message box.

If the same message box appears, make contact with Bio-logic Systems Corp. Customer Support at 1-800-272-8075 for troubleshooting assistance.

## Entering and saving patient information

The image shows a software interface. At the top, a button labeled 'LOAD DEMOGRAPHICS AND PROTOCOLS' is highlighted. A callout box points to it with the text 'Click on this button ...'. Another callout box points to the main dialog box with the text '... to launch this display screen'. The dialog box is titled 'Please Enter Patient Information before Continuing:' and contains several input fields and buttons. The 'Patients File Name' field is pre-filled with '\_021804\_0115PM'. The 'Test Date' field is pre-filled with '2/18/2004'. The 'Clear Patient Information' and 'Cancel' buttons are located to the right of the 'Test Date' field. The 'Save & Continue' button is at the bottom right.

LOAD DEMOGRAPHICS AND PROTOCOLS

Click on this button ...

... to launch this display screen

Please Enter Patient Information before Continuing:

Patients File Name: \_021804\_0115PM

Patient ID:

Test Date: 2/18/2004

Clear Patient Information Cancel

Last Name:

First Name:

Birth Date:

Gender:

Tester:

Physician:

Save & Continue

To start a new test, you must create a file that contains the information you want to gather. To do this with the MASTER application, follow these steps:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Wait until the DSP application initializes.  
A message box appears on the screen soon after you start the MASTER program. This message box contains a progress bar that "fills" as the DSP application initializes. Wait until the progress bar fills and the message box disappears before you continue.
3. Select (click on) the Load Demographics and Protocols command button.  
This launches the Patient Information screen.



Please Enter Patient Information before Continuing:

Type information into these fields:

120202\_0153PM  
Patients File Name

Patient ID:   
Test Date: 12/2/2002  
Clear Patient Information Cancel

Last Name:   
First Name:   
Birth Date:   
Gender:

Tester:   
Physician:   
Toggle gender with this spin button

Save & Continue

Please Enter Patient Information before Continuing:

Note that this field contains the patient's name and the test date.

Renfield\_Dwight\_120202\_0156PM  
Patients File Name

Patient ID: 4312789  
Test Date: 12/2/2002  
Clear Patient Information Cancel

Last Name: Renfield  
First Name: Dwight  
Birth Date: 16-Nov-02  
Gender: MALE

Tester: Frye  
Physician: Richards

Save & Continue

Click on Save and Continue

4. Select (click on) the Clear Patient Information command button, if necessary.  
This clears all of the information from all of the data entry fields on this screen.
5. Place the mouse cursor in the Patient ID field and click the LEFT mouse button.  
This places a text cursor in that field.
6. Type a unique number that you want to use for your patient identification code.
7. Place the mouse cursor in the Last Name field and click the LEFT mouse button.  
This places a text cursor in that field.
8. Type the last name (that is, the surname) of the patient into this field.

Please Enter Patient Information before Continuing:

120202\_0153PM Patients File Name

Type information into these fields

Patient ID: [ ] Test Date: 12/2/2002

Last Name: [ ] First Name: [ ] Birth Date: [ ] Gender: [ ]

Tester: [ ] Physician: [ ]

Clear Patient Information Cancel

Toggle gender with this spin button

Save & Continue

Please Enter Patient Information before Continuing:

Renfield\_Dwight\_120202\_0156PM Patients File Name

Note that this field contains the patient's name and the test date.

Patient ID: 4312789 Test Date: 12/2/2002

Last Name: Renfield First Name: Dwight Birth Date: 16-Nov-02 Gender: MALE

Tester: Frye Physician: Richards

Clear Patient Information Cancel

Save & Continue

Click on Save and Continue

9. Place the mouse cursor in the First Name field and click the LEFT mouse button.  
This places a text cursor in that field.

10. Type the first name (that is, the given name) of the patient into this field.

**Note:** As you enter the patient's name and move from field to field, the Patient's File Name field fills automatically. The file name combines the patient's first name, last name, and the test date.

11. Place the mouse cursor in the Birthdate field and click the LEFT mouse button.  
This places a text cursor in that field.
12. Type the birthdate for the patient into this field.  
Any date format is acceptable.
13. Place the mouse cursor in the Physician field and click the LEFT mouse button.  
This places a text cursor in that field.
14. Type the tester's name or other identifying information into this field.
15. Type the physician's name or other identifying information into this field.

Please Enter Patient Information before Continuing:

Type information into these fields:

Patient ID:

Test Date:

Patients File Name:

Clear Patient Information

Cancel

Last Name:

First Name:

Birth Date:

Gender:

Tester:

Physician:

Toggle gender with this spin button

Save & Continue

Please Enter Patient Information before Continuing:

Note that this field contains the patient's name and the test date.

Patient ID:

Test Date:

Patients File Name:

Clear Patient Information

Cancel

Last Name:

First Name:

Birth Date:

Gender:

Tester:

Physician:

Save & Continue

Click on Save and Continue

16. Use the spin button next to the Gender field to toggle the gender of the patient, if necessary.
17. Select (click on) the Save & Continue command button.  
The MASTER program saves the information from this screen to your system's storage area under the file name that appears in the Patient's File Name field.

**OR**

18. Select (click on) the Cancel command button.  
This closes the Patient Information screen without saving information or starting a test. The MASTER program returns to the MASTER Main Menu screen.

## NOTES

Use this page for your own notes.



## Configuring protocols for a test: the Test Parameters screen

Please Enter Patient Information before Continuing: 021804\_0115PM

Patient ID: [ ] Test Date: 2/18/2004 Clear Patient Information Cancel

Last Name: [ ] First Name: [ ] Birth Date: [ ] Gender: [ ]

Tester: [ ] Save & Continue

Click on the Save and Continue command button

TEST PARAMETERS

Choose Protocol: BPR: 500, 1000, 2000, ... to get the Test Parameters screen

RAW EEG test data to file (on system performance)

Left Ear: 1 2 3 4 5 6 7 8

Right Ear: 1 2 3 4 5 6 7 8

Carrier Frequency: 500 1000 2000 4000 500 1000 2000 4000

Modulation (Hz): 02.00 04.00 07.00 09.00 11.00 14.00 16.00 19.00

FM Percentage: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

FM phase: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

Frequency ON/OFF: ON ON ON ON ON ON ON ON

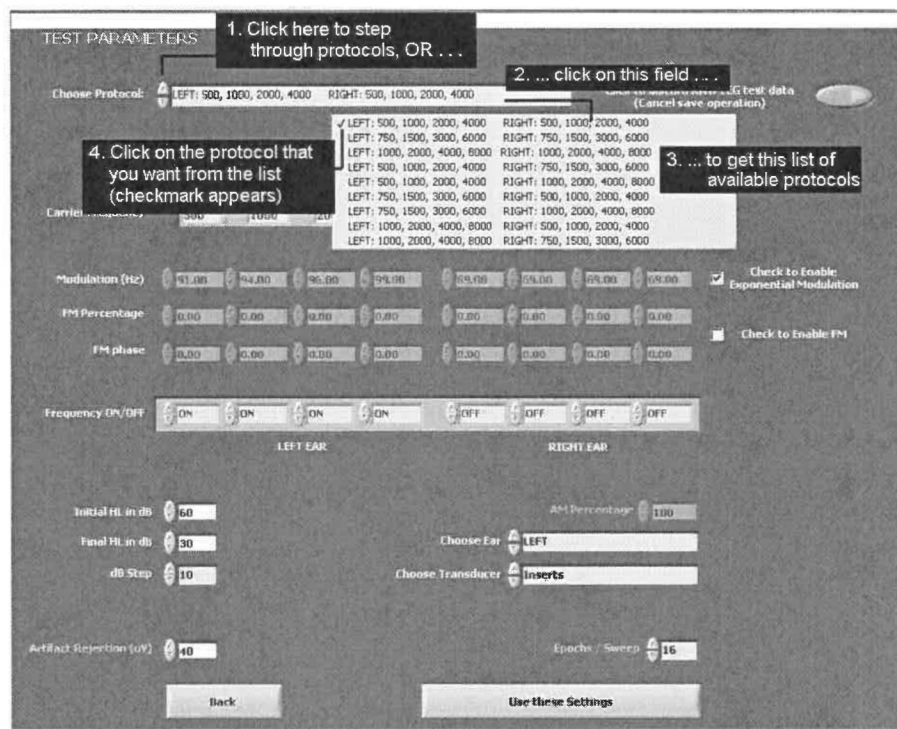
LEFT EAR: Initial HL in dB: 60 Final HL in dB: 30 dB Step: 10

RIGHT EAR: AM Percentage: 100 Choose Ear: BOTH Choose Transducer: Ear Muffs

Artifact Rejection (cV): 40 Epochs / Sweep: 16

To configure protocols for a MASTER test, you use controls the Test Parameters screen. Follow these steps:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Follow the procedures in the [Entering and saving patient information](#) section of this document.
3. Select (click on) the Save & Continue command button.
4. Select (click on) the OK command button,  
The **Test Parameters** screen appears.



5. Use the spin button next to the choose Protocol field to step through the available protocols:

—Use the up arrow spin button to step through the protocols from bottom to top.

—Use the down arrow spin button to step through the protocols from top to bottom.

**OR**

6. Select (click on) the Choose Protocol field.  
A list of the available protocols appears.
7. Select (click on) the protocol that you want from that list.  
A checkmark appears next to the protocol you choose and the frequency values from that protocol populate (fill) the data fields in the Choose Protocol field.

The screenshot shows the 'TEST PARAMETERS' screen with the following callouts:

- Click this button to toggle between saving and discarding Raw EEG data**: Points to the 'Click to discard RAW EEG test data (Cancel save operation)' button.
- Click this checkbox to activate (checkmark) or deactivate (no checkmark) Exponential Modulation**: Points to the 'Check to Enable Exponential Modulation' checkbox.
- Use these buttons to toggle respective carrier frequencies On or OFF**: Points to the 'Frequency ON/OFF' row of buttons.
- Click this checkbox to activate (checkmark) or deactivate (no checkmark) Frequency Modulation**: Points to the 'Check to Enable FM' checkbox.
- Use these spin buttons, OR ...**: Points to the 'Initial F8 in dB', 'Final F8 in dB', and 'dB Step' spin controls.
- ...type data into these fields**: Points to the 'Initial F8 in dB', 'Final F8 in dB', and 'dB Step' fields.

8. Select (click on) the  button to toggle the program between saving and discarding the RAW EEG data it collects.

**Note:** Collecting RAW EEG data may slow down the performance of your system.

9. Select (click on) the checkbox next to the Check to Enable Exponential Modulation item:
  - Until a checkmark appears to turn the feature ON.
  - Until no checkmark appears to turn the feature OFF.

**NOTE:** The Carrier Frequency, Modulation, FM Percentage, and FM phase fields are currently Read Only.

10. Select (click on) the checkbox next to the Check to Enable FM item:
  - Until a checkmark appears to turn the feature ON.
  - Until no checkmark appears to turn the feature OFF.
11. Use the spin button next to each field in the Frequency ON/OFF area to toggle its respective Carrier Frequency ON or OFF.

**OR**

12. Click on each ON/OFF field individually.
  - A pop-up display with ON or OFF choices appears.
13. Click ON or OFF.



## OPERATING PROCEDURES

**TEST PARAMETERS**

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000

Click this button to toggle between saving and discarding Raw EEG data

Click to discard RAW EEG test data (Cancel save operation)

Carrier Frequency: 500 1000 2000 4000 500 1000

Click this checkbox to activate (checkmark) or deactivate (no checkmark) Exponential Modulation

Modulation (Hz): 23.00 24.00 26.00 27.00 29.00 30.00 32.00 33.00

FM Percentage: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

FM phase: 0.00

Use these buttons to toggle respective carrier frequencies On or OFF

Frequency ON/OFF: ON ON ON ON OFF OFF OFF

Click this checkbox to activate (checkmark) or deactivate (no checkmark) Frequency Modulation

LEFT EAR RIGHT EAR

Initial HL in dB: 60

Final HL in dB: 30

dB Step: 10

Use these spin buttons, OR ...

... type data into these fields

Choose Ear: LEFT

Choose Transducer: Inserts

Artifacts Rejection (uV): 40

Epochs / Sweep: 16

Back Use these Settings



### WARNING

Warning and Caution messages appear if you try to exceed maximum intensity limits in the Hearing Level fields. These maximum intensity limits vary depending on the type of transducer you are using, the type of cable you attach, and the number of carrier frequencies. For more information see the Handling High and Maximum Intensity conditions section of this document.



14. Place the mouse cursor in the Initial HL (Hearing Level) in dB (decibels) field and click the LEFT mouse button.  
This places a text cursor in that field.

15. Type the value that you want to use in that field. (See the **WARNING** on the previous page and the Handling High and Maximum Intensity conditions section of this document).

**OR**

16. Use the spin button next to the Initial HL in dB field:

- Select (click on) the up arrow button to increment the value in the field by one
- Select the down arrow button to decrement the value in the field by one.
- Use these buttons until you reach the value that you want for the initial HL in dB.

See the **WARNING** on the previous page and the Handling High and Maximum Intensity conditions section of this document.

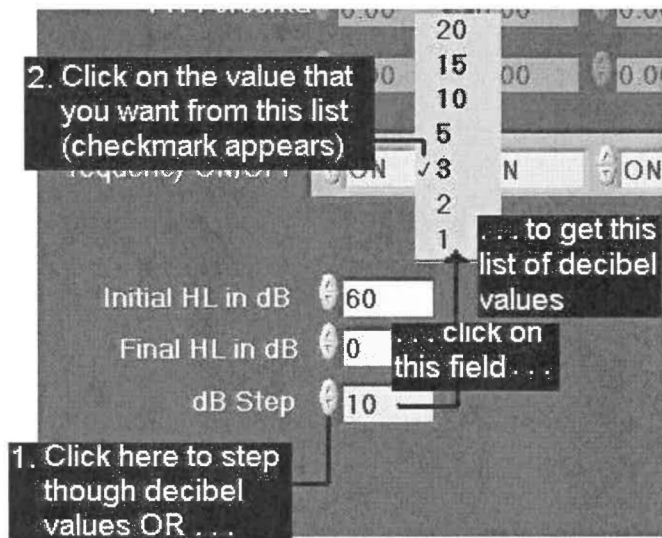
17. Place the mouse cursor in the Final HL (Hearing Level) in dB (decibels) field and click the LEFT mouse button.  
This places a text cursor in that field.

18. Type the value that you want to use in that field.

**OR**

19. Use the spin button next to the Final HL in dB field:

- Select (click on) the up arrow button to increment the value in the field by one
- Select the down arrow button to decrement the value in the field by one.
- Use these buttons until you reach the value that you want for the final HL in dB.



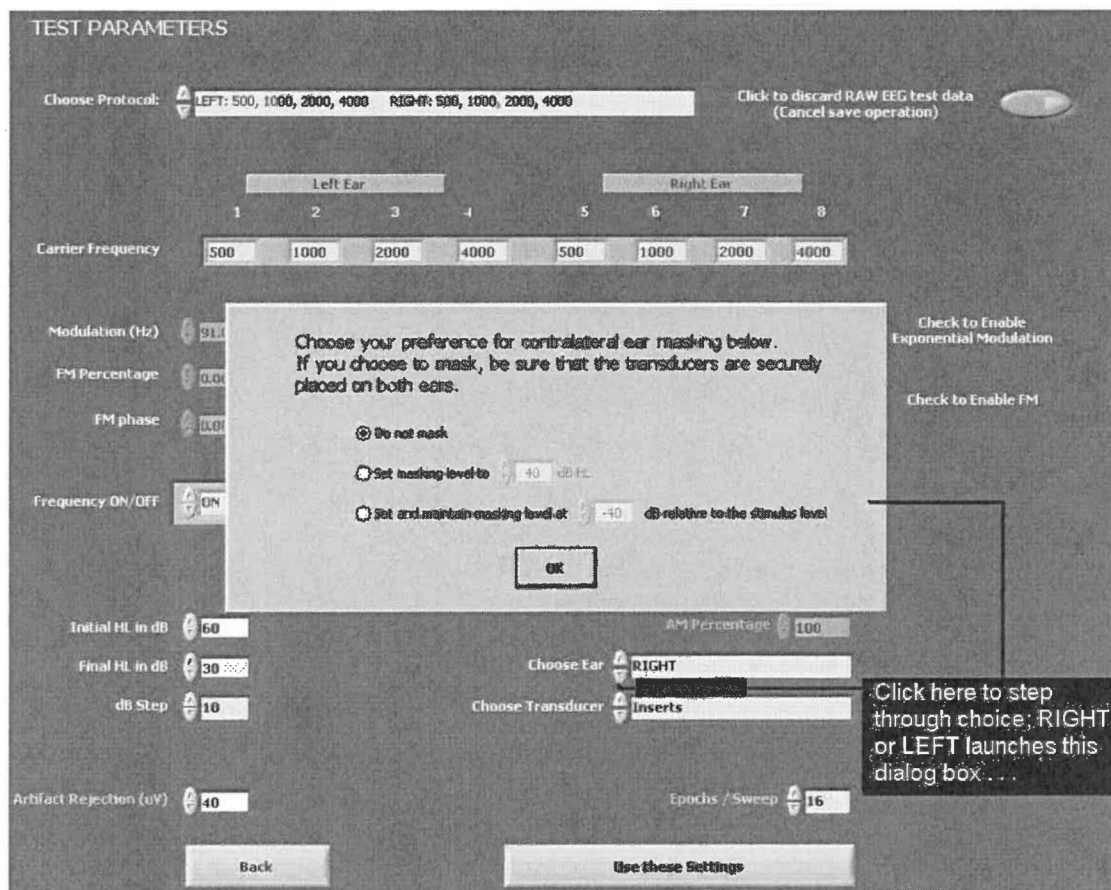
20. Use the spin button next to the dB Step field to step through the available protocols:

- Use the up arrow spin button to step through the options from bottom to top.
- Use the down arrow spin button to step through the options from top to bottom.

**OR**

21. Select (click on) the dB Step field.  
A list of the available dB values appears.
22. Select (click on) the dB value that you want from that list.  
A checkmark appears next to the dB value you choose and that dB value fills the dB Step field.

**NOTE: The AM Percentage field is currently Read Only.**

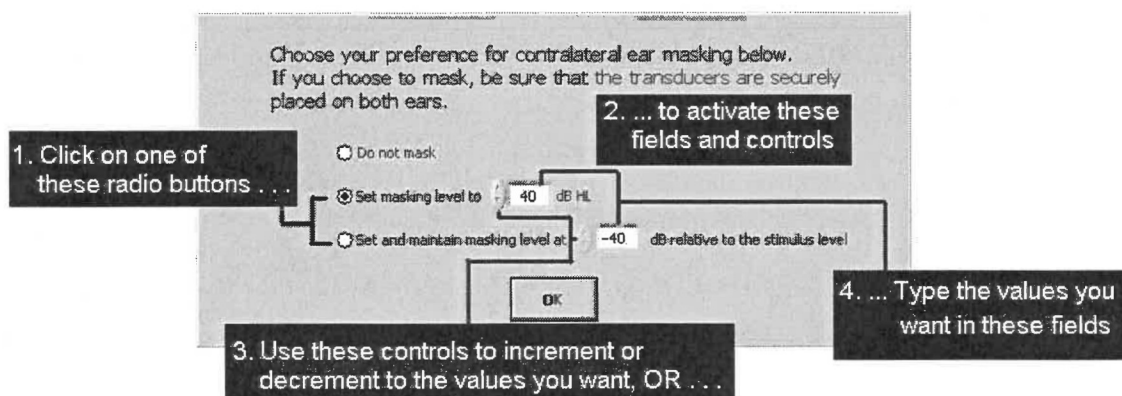


23. Use the spin button next to the Choose Ear field to step through the options (RIGHT, LEFT, BOTH)

—Use the up arrow spin button to step through the options from bottom to top.

—Use the down arrow spin button to step through the options from top to bottom.

**Note:** If you choose the RIGHT or LEFT ear option, the MASTER program displays the Masking dialog box (as shown above) and leads you through a masking sequence. When you are using the Bone Conduction transducer, a different masking dialog box appears that lets you select the masking transducer as well.



24. Select (click on) the radio button next to the masking function you want:

- Click **Do not mask** to disable masking.
- Click **Set masking level to** to set a masking level.
- Click **Set and maintain masking level at** to set a masking level and have the system maintain that masking level relative to the stimulus level.

25. Click on the **Set masking level to** field to place a cursor in that field.

26. Type the masking level you want in that field.

**OR**

27. Use the spin buttons next to the **Set masking level to** field to increment (up arrow) or decrement (down arrow) to the masking level you want.

28. Click on the **Set and maintain masking level at** field to place a cursor in that field.

29. Type the masking level you want in that field.

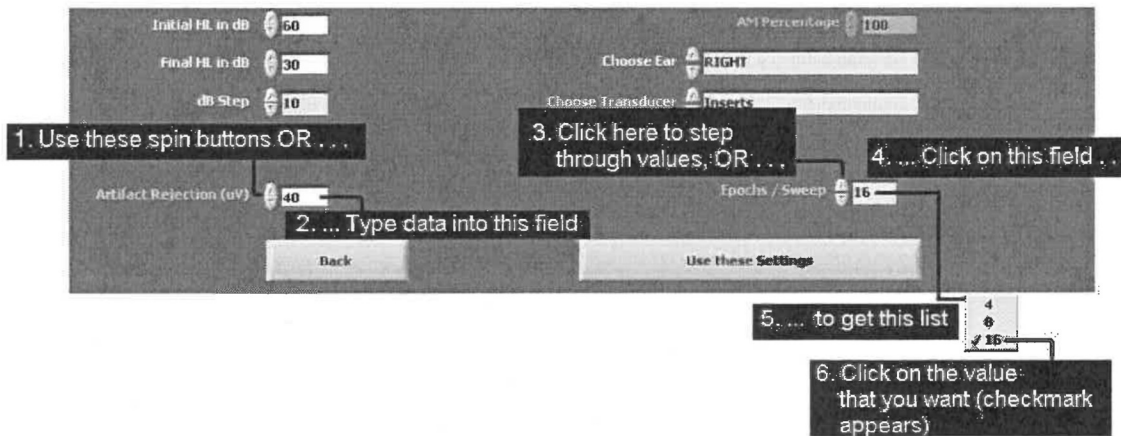
**OR**

30. Use the spin buttons next to the **Set and maintain masking level at** field to increment (up arrow) or decrement (down arrow) to the masking level you want.

31. Click on the OK command button.  
This closes the Masking dialog box.



## OPERATING PROCEDURES



32. Use the spin button next to the Choose Transducer field to step through the transducers available.

Transducers include: Inserts, Headphones, Ear Muffins®, Bone Conduction, and Free Field.

33. Choose the option that you want.

34. Place the mouse cursor in the Artifact Rejection (uV) field and click the LEFT mouse button.  
This places a text cursor in that field.

35. Type the value that you want to use in that field.

**OR**

36. Use the spin button next to the Artifact Rejection (uV) field:

—Select (click on) the up arrow button to increment the value in the field by one

—Select the down arrow button to decrement the value in the field by one.

—Use these buttons until you reach the microvolt value that you want to use for Artifact Rejection.

37. Use the spin button next to the Epochs / Sweep field to step through the available values:

—Use the up arrow spin button to step through the options from bottom to top.

—Use the down arrow spin button to step through the options from top to bottom.

**OR**

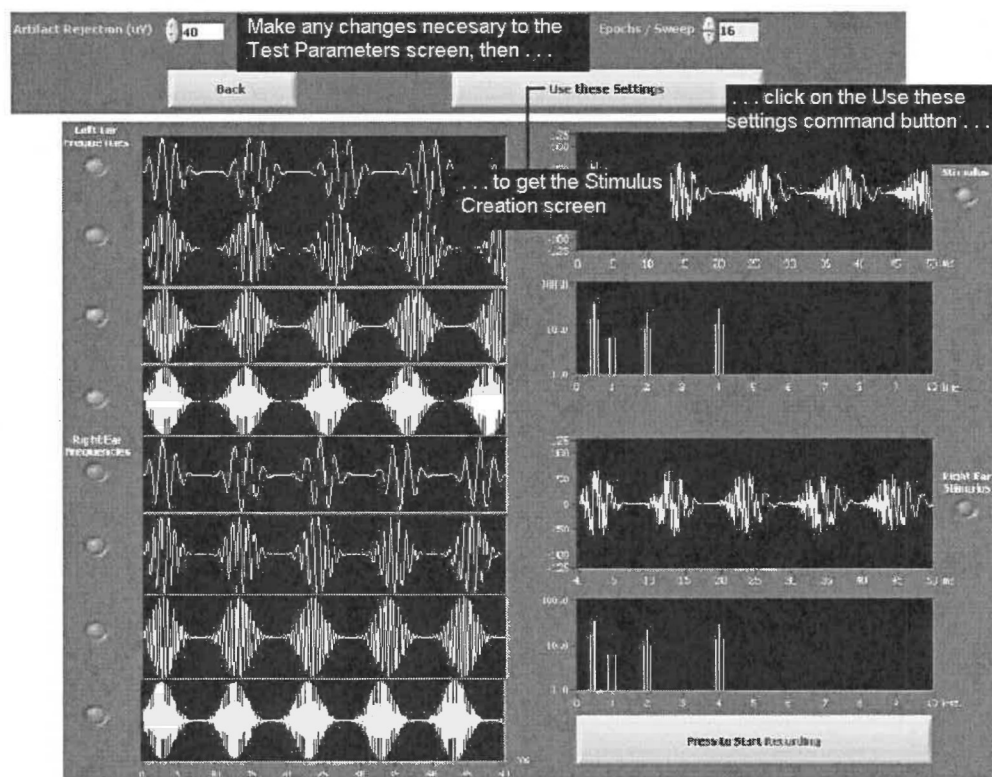
38. Select (click on) the Epochs / Sweep field.

A list of the available values appears.

39. Select (click on) the value that you want from that list.

A checkmark appears next to the value you choose and that choice fills the Epochs / Sweep field.

## Starting the test

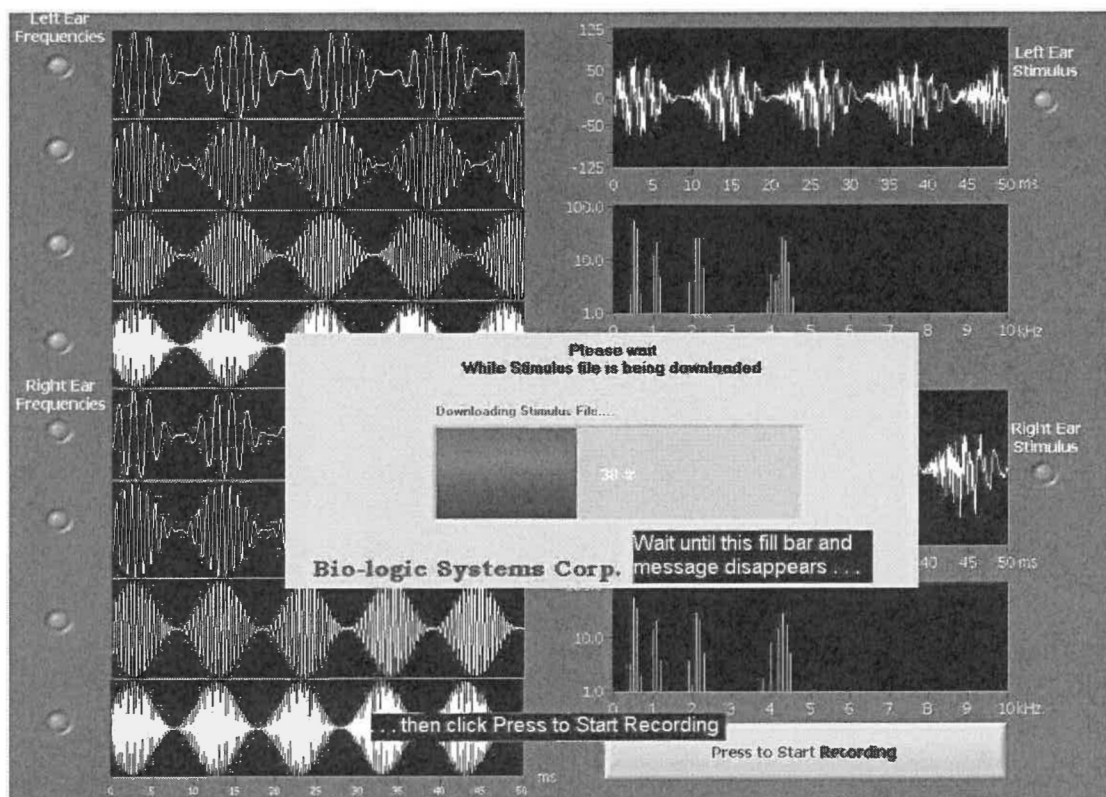


After you complete the Test Parameters screen, you are ready to start the MASTER test. Follow these steps:

1. Follow the steps in the Configuring protocols for a test: the Test Parameters screen section of this document.
2. Select (click on) the Use these Settings command button.

The Stimulus Creation screen appears.

**Note:** Once the MASTER creates the stimulus, a progress bar appears that tracks downloading the stimulus to the Navigator® Pro unit. The Press to Start Recording command button does not appear until the download ends and the progress bar disappears.



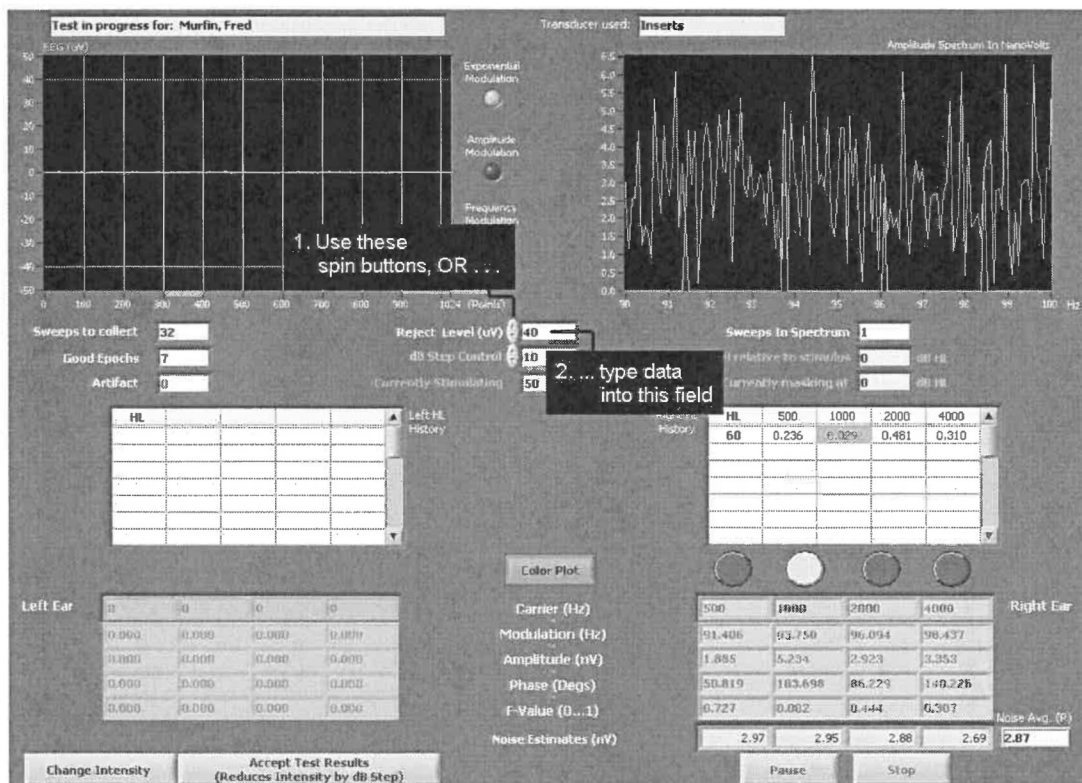
3. Wait until the graphs on the right of the Stimulus Creation screen fill and the "Stimulus download" message box disappears.
4. Select (click on) the Press to Start Recording button.

This starts the test and launches the Main Test screen.

**NOTE:** The Press to Start recording button appears after the MASTER program loads the DSP.



## Using the Main Test screen



**Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).**

The Main Test screen has displays that show you the progress of the MASTER test and controls that let you adjust test input while the test is running. To use this screen:

1. Follow the steps in the Basic test procedures section of this document.
2. Place the mouse cursor in the Reject level (uV) field and click the LEFT mouse button. This places a text cursor in that field.
3. Type the value that you want to use in that field.

**OR**

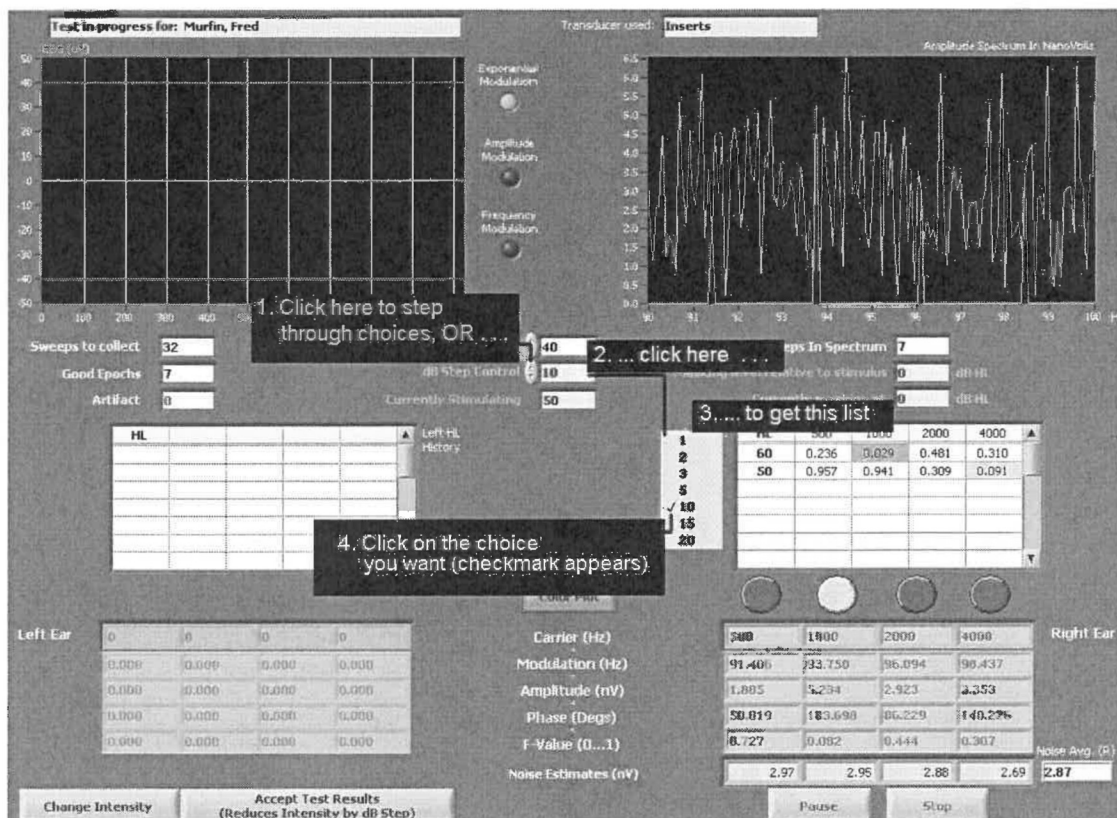
4. Use the spin button next to the Reject level (uV) field:

—Select (click on) the up arrow button to increment the value in the field by one

—Select the down arrow button to decrement the value in the field by one.

—Use these buttons until you reach the microvolt level where you want the MASTER program to reject the data from the sweep.





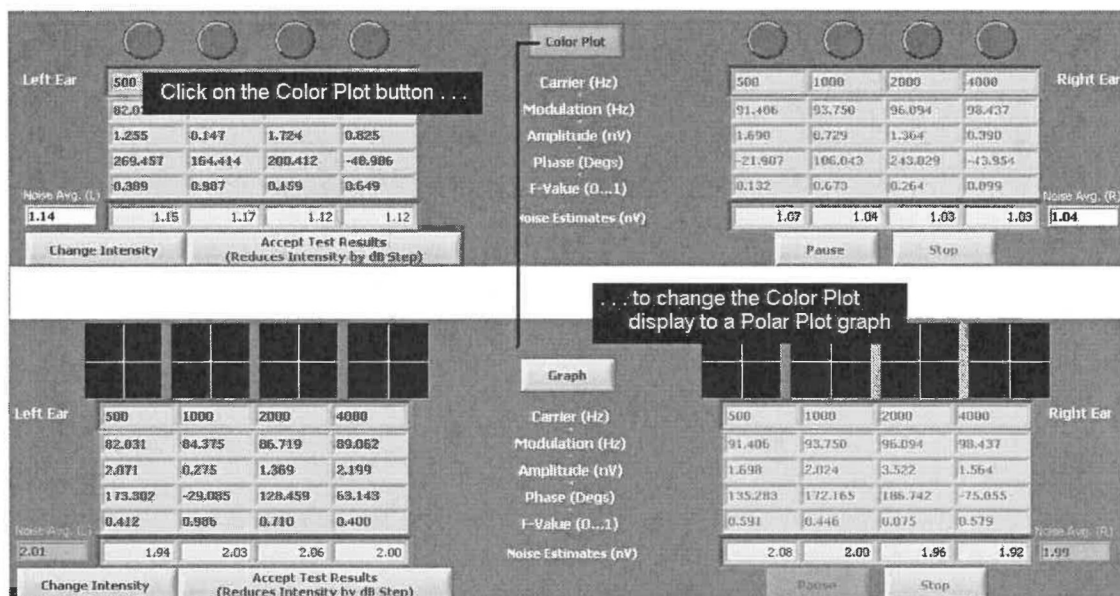
5. Use the spin button next to the db Step Control field to step through the available values:

—Use the up arrow spin button to step through the options from bottom to top.

—Use the down arrow spin button to step through the options from top to bottom.

OR

6. Select (click on) the db Step Control field.  
A list of the available values appears.
7. Select (click on) the value that you want from that list.  
A checkmark appears next to the value you choose and that choice fills the db Step Control field.



8. Check the Color Plot oval display.

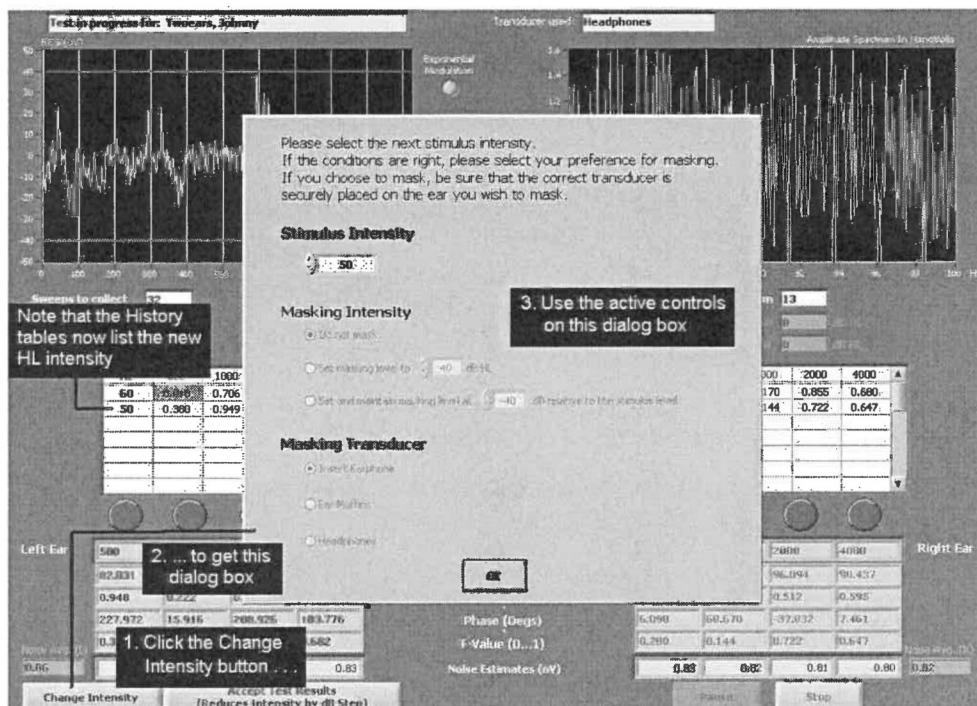
This display consists of eight, color-coded ovals that show you the status for each frequency you have chosen:

GREEN: A response was detected with a confidence level of 95% or higher based on statistical analysis of the EEG.

YELLOW – A response may or may not be present. The statistical confidence is 90-95%.

RED - No significant response is present based on statistical measures. Select (click on) the Graph button.

9. Check the "Polar Plot" graph.



— If the results or status are unacceptable

10. Select (click on) the Change Intensity button.  
This stops the test without saving results and launches a **Select next intensity dialog box**.

**Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).**

11. Select (click on) the Stimulus Intensity data entry field.  
This places a text cursor in that field.
12. Type the Stimulus Intensity you want to use in that field.

**OR**

13. Select (click on) the spin buttons next to that field to increment (up arrow) or decrement (down arrow) to the stimulus intensity you want.
14. Use the other active controls on the **Select next intensity dialog box** to select masking intensities and specify the masking transducer.

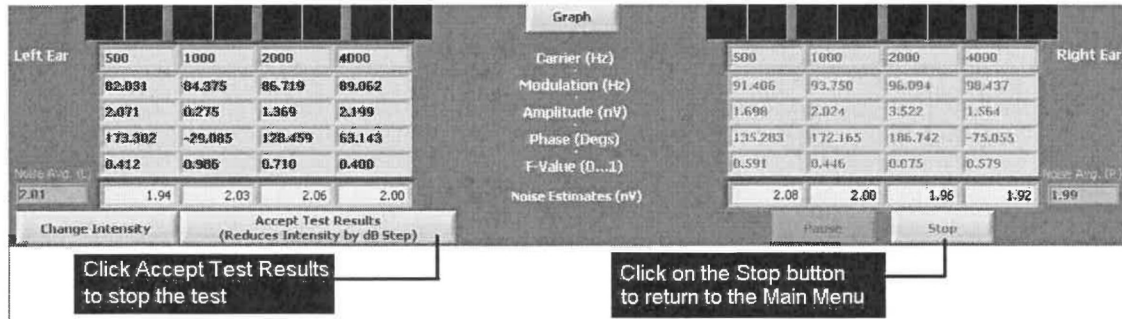
—Masking intensity options are available if you are testing a single ear.  
—Masking transducer options are available if you are using bone conduction.

For more information, see the **Using the Ear-to-Mask sequence** section of this document.

15. Select (click on) the OK command button.  
This closes the **Select next intensity dialog box** and continues the test at the intensity you have chosen.



## OPERATING PROCEDURES



— If the results and status are acceptable

16. Select (click on) the Accept Test Results button to stop the test at that intensity, save the results, and automatically move to the next intensity in the sequence.

**Note: The Change Intensity and Accept Test Results control buttons remain hidden until the test runs one complete Fast Fourier Transform (FFT).**

17. Select (click on) the Stop button to return to the MASTER Menu screen.

### Handling test results

Once you have collected test data, you can analyze that data and generate audiograms for it. This involves:

Using the Demographics and Audiogram screen

and

Using the Audiogram screen

Illustrated lead-throughs follow.





**M\*A\*S\*T\*E\*R - Demographics and audiogram**

Statistics results for: Bernstein, Leonard

open aud file (Statistics Test Results)

Transducer used: Ear Muffs

☒ Use Correction  
☐ Ignore Correction  
☐ Better than...  
☐ Worse than...

1. Click on one of these radio buttons

2. Click on one of these readings ...

|    |       | Noise(L) |       |       |      | Sweeps (L) |  |
|----|-------|----------|-------|-------|------|------------|--|
|    |       | 500      | 1000  | 2000  | 4000 |            |  |
| 50 | 0.590 | 0.674    | 0.037 | 0.400 | 2.01 | 2          |  |
| 40 | 0.401 | 0.092    | 0.522 | 0.798 | 0.47 | 32         |  |
|    |       |          |       | 0.911 | 0.52 | 28         |  |

3. ... to place its HL value (with or without correction) in the related field in this table

|    |       | Noise(R) |       |       |      | Sweeps (R) |  |
|----|-------|----------|-------|-------|------|------------|--|
|    |       | 500      | 1000  | 2000  | 4000 |            |  |
| 60 | 0.591 | 0.446    | 0.075 | 0.579 | 1.99 | 2          |  |
| 50 | 0.667 | 0.577    | 0.638 | 0.787 | 0.32 | 32         |  |
| 40 | 0.486 | 0.517    | 0.385 | 0.585 | 0.53 | 28         |  |

5. Click on one of these command buttons

4. Type the HL Threshold Level that you want to use for each frequency

|           | 500 | 750 | 1000 | 1500 | 2000 | 3000 | 4000 | 6000 | 8000 |
|-----------|-----|-----|------|------|------|------|------|------|------|
| Left Ear  |     |     |      |      |      |      |      |      |      |
| Right Ear | 20  |     | 40   |      | 60   |      | 80   |      |      |

EXIT

Generate Audiogram (Do not Save Threshold values)

Generate Audiogram (Save Threshold values)

3. Select (click on) one of the radio correction buttons.  
Use these buttons to add a correction to the trace on the audiogram. You can select these corrections according to the transducer you use.
  4. Select (click on) a reading in one of the Left or Right Ear Frequencies tables.  
The HL for the reading you choose appears automatically in the related cell in the Hearing Threshold Table.
- OR**
5. Click on one of the cells in the Hearing Threshold Table.  
These cells are for entry of the hearing threshold level of the frequencies for the left or right ear. Clicking in any of them places a text cursor in the cell.
- AND**
6. Type in the hearing threshold level you want to assign to the related frequency based on F-statistical data in the tables above. Apply additional corrections as you see fit.
  7. Repeat these steps for any other Left Ear or Right Ear hearing threshold level that you want to set.
  8. Click on one of the Generate Audiogram command buttons.  
This closes the statistics screen, calculates an audiogram for the data you have entered, and launches the Audiogram screen.

## Using the Audiogram screen

**Physiological Audiogram:**

Last Name:  First Name:  Birth Date:  Gender:  Transducer used:

Left Ear Audiogram: Right Ear Audiogram:

Left Ear Controls: ☒ AC Threshold ☐ DC Threshold ☐ ERT Threshold  
☒ Threshold better than ☐ Threshold worse than

Right Ear Controls: ☐ AC Threshold ☐ DC Threshold ☐ ERT Threshold  
☐ Threshold better than ☐ Threshold worse than

The MASTER system lets you generate and print audiograms from the data you. Once you have run a test and generated data, the Audiogram screen can show you plots for all of the data points you have collected. Follow these steps:

1. Run a test with the MASTER system.  
Bio-logic Systems Corp. recommends that you follow all of the procedures in this document in order. If you encounter difficulty, stop immediately and make contact with Bio-logic Customer Service at 1-800-272-8075. If you have already run tests and want to review their results or perform additional analysis on them, see the How to view the results of previous tests portion of this document.
2. Select (click on) one of the Generate Audiogram buttons on the Demographics and Audiogram screen.  
This closes that screen, calculates an audiogram for the data you have selected, and launches the Physiological Audiogram screen.
3. Select (click on) the Print Audiogram button.  
This sends the Audiograms to your system's output device.

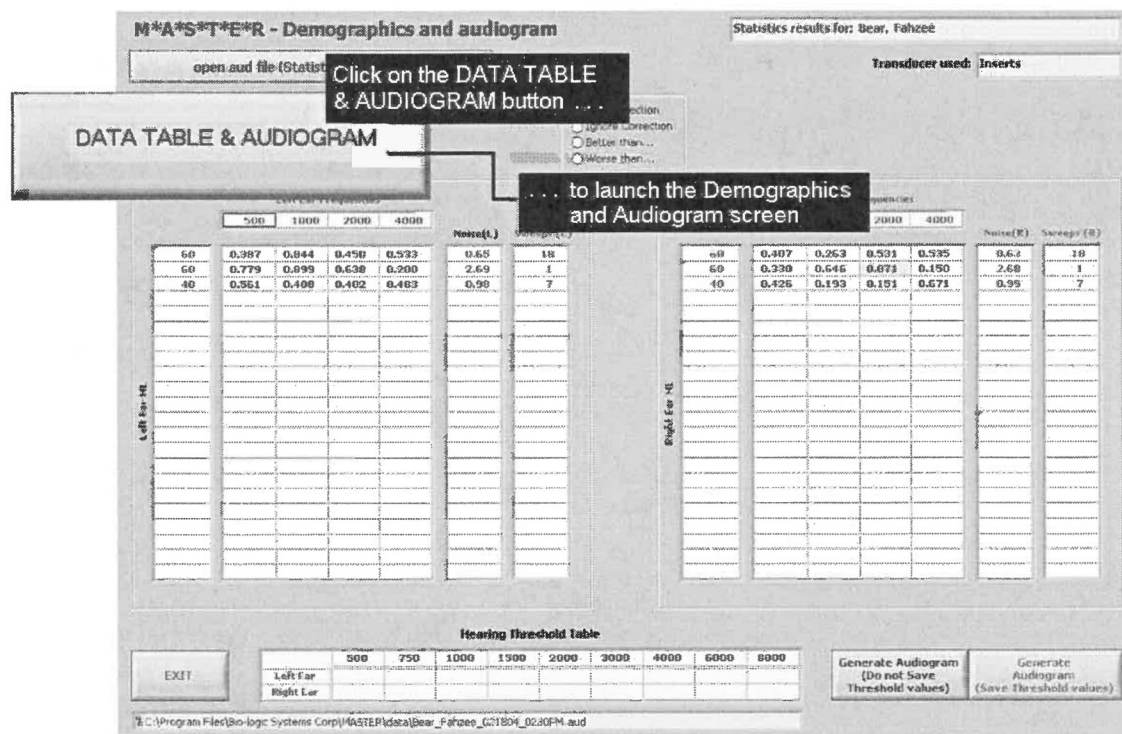
**Note:** Printing an audiogram when you have viewed and created it from a single .aud file also prints the statistics table that you used to create the audiogram.

OR

4. Select (click on) the Exit command button.  
This closes the Audiogram for Patient screen without printing the data and re-launches the MASTER Menu screen.



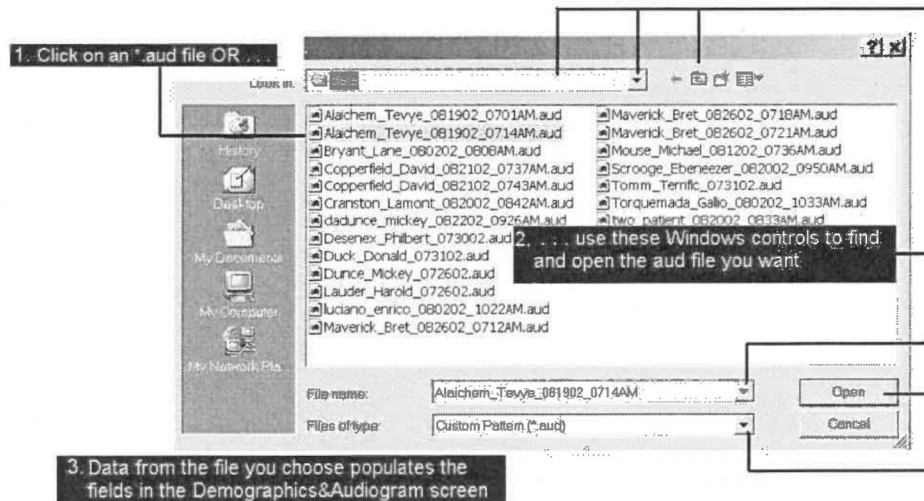
## How to view the results of previous tests



Once you have run a test, the Demographics and Audiogram screen lets you track statistical values for the frequencies you used in that test. Follow these steps:

1. Run a test with the MASTER system.  
This step is optional. If you have already run tests and want to perform statistical analysis on them, proceed to step 2.
2. Select (click on) the Data Table & Audiogram command button.  
A Demographics and Audiogram screen appears.





**M\*A\*S\*T\*E\*R - Demographics and audiogram**

Statistics results for: Alachem\_Tevye

open aud file (Statistics Test Results)

Transducer used: Inserts

☒ Use Correction  
☐ Ignore Correction  
☐ Better than...  
☐ Worse than...

| Left Ear Frequencies |       |       |       |       |  | Noise (L) |  | Sweeps (L) |  | Right Ear Frequencies |       |       |       |       |  | Noise (R) |  | Sweeps (R) |  |
|----------------------|-------|-------|-------|-------|--|-----------|--|------------|--|-----------------------|-------|-------|-------|-------|--|-----------|--|------------|--|
|                      | 500   | 1000  | 2000  | 4000  |  |           |  |            |  |                       | 500   | 1000  | 2000  | 4000  |  |           |  |            |  |
| 60                   | 0.779 | 0.602 | 0.519 | 0.299 |  |           |  |            |  |                       | 0.330 | 0.276 | 0.227 | 0.495 |  |           |  |            |  |
| 60                   | 0.615 | 0.276 | 0.336 | 0.210 |  |           |  |            |  |                       | 0.615 | 0.543 | 0.428 | 0.220 |  |           |  |            |  |

3. Select (click on) the open aud file (Statistics Test Results) command button. The MASTER program displays a Choose file to read dialog box.
4. Select (click on) the .aud file that you want to use from the list in the "Choose file to read" dialog box.

OR

5. Use the "Choose file to read" dialog box to navigate to the file you want to open.

Once you find and open the file you want, the MASTER system "populates" (that is, fills in) the fields and table cells in the Demographics and Audiogram screen with the data from that file.

**Note:** The Microsoft Corporation® has thoroughly documented how to use dialog boxes of this type. For more information, consult the documentation that accompanies your Windows program (usually on the Windows CD).

**M\*A\*S\*T\*E\*R - Demographics and audiogram**

Statistics results for: Bernstein, Leonard

Transducer used: Ear Muffs

open aud file (Statistics Test Results)

☒ Use Correction  
☐ Ignore Correction  
☐ Better than...  
☐ Worse than...

**1. Click on one of these radio buttons**

**2. Click on one of these readings ...**

|    |       | 4000  |       |       |      | Naive(L) |  | Sweep(L) |  |
|----|-------|-------|-------|-------|------|----------|--|----------|--|
|    |       |       |       |       |      |          |  |          |  |
| 50 | 0.590 | 0.674 | 0.937 | 0.400 | 0.47 | 32       |  |          |  |
| 40 | 0.401 | 0.092 | 0.522 | 0.911 | 0.52 | 28       |  |          |  |

**3. ... to place its HL value (with or without correction) in the related field in this table**

|           |  | 500 |  |  |  | 1000 |  |  |  | 2000 |  |  |  | 4000 |  |  |  | 6000 |  |  |  | 8000 |  |  |  |
|-----------|--|-----|--|--|--|------|--|--|--|------|--|--|--|------|--|--|--|------|--|--|--|------|--|--|--|
|           |  |     |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |
| Left Ear  |  |     |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |
| Right Ear |  |     |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |      |  |  |  |

**4. Type the HL Threshold Level that you want to use for each frequency**

**5. Click on one of these command buttons**

6. Select (click on) one of the radio correction buttons.  
Use these buttons to add a correction to the trace on the audiogram. You can select these corrections according to the transducer you use. See the [How to use the Calibration Preferences tab set](#) section of this document for more information.

7. Select (click on) a reading in one of the cells in the Left or Right Ear Frequencies tables.  
The HL for the reading you choose appears automatically in the related cell in the Hearing Threshold Table.

OR

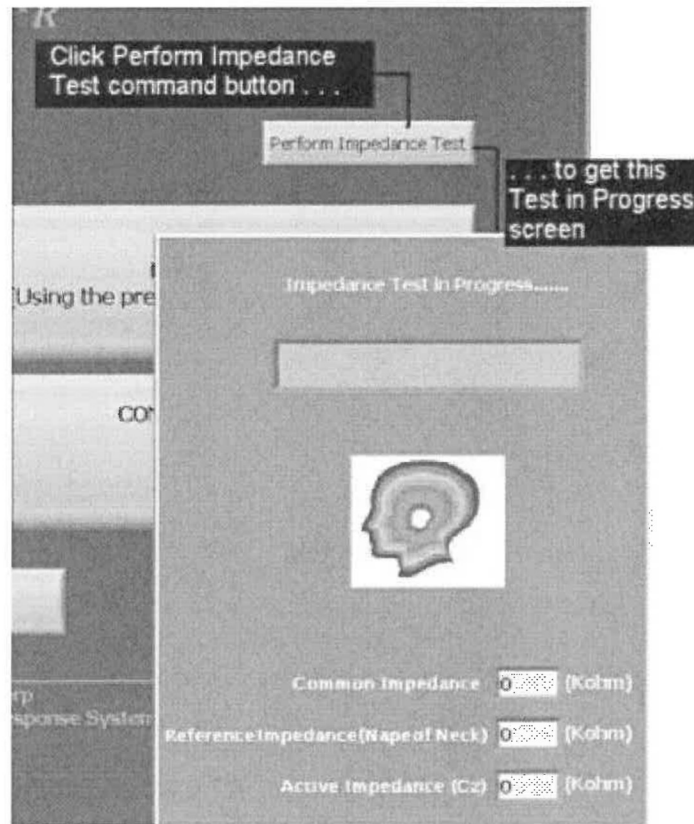
8. Click on one of the cells in the Hearing Threshold Table.  
These cells are for entry of the hearing threshold level of the frequencies for the left or right ear. Clicking in any of them places a text cursor in the cell.

AND

9. Type in the hearing threshold level you want to assign to the related frequency based on F-statistical data in the tables above. Apply additional corrections as you see fit.
10. Repeat these steps for any other Left Ear or Right Ear hearing threshold level that you want to set.
11. Click on one of the Generate Audiogram command buttons.  
This closes the statistics screen, calculates an audiogram for the data you have entered, and launches the Audiogram screen.

# ADDITIONAL OPERATING PROCEDURES

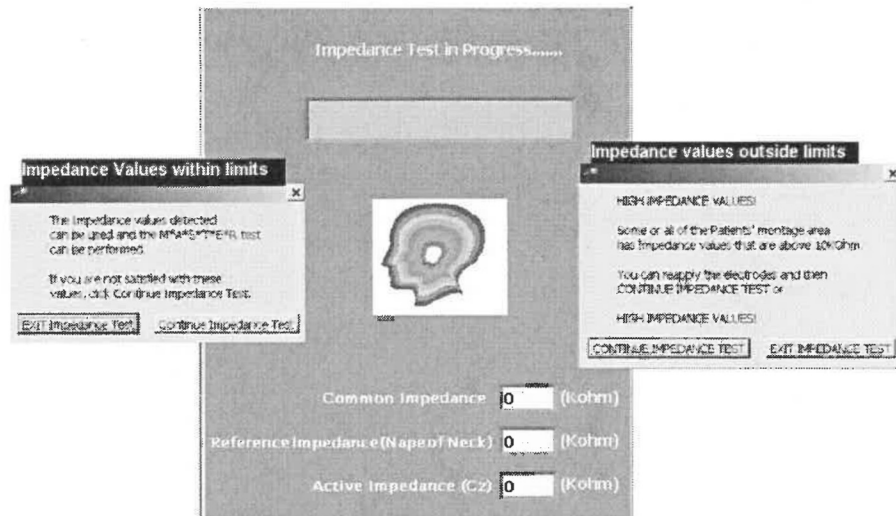
## How to run an impedance test



Users run impedance tests to verify electrode placement. To run an impedance test for the MASTER program and its hardware:

1. Launch the MASTER program.  
See the [Starting the MASTER program](#) section of this document.
2. Select (click on) the Perform Impedance Test command button.  
The MASTER program launches an Impedance Test in Progress screen and checks three impedance values:
  - Common impedance
  - Reference impedance (Nape of Neck)
  - Active impedance (Cz)





3. Wait until the Impedance test ends.  
A “within” or “outside of” limits message appears.
4. Check the values in the three impedance fields.
5. Select (click on) the EXIT impedance test command button to end the impedance test.  
If you elect to exit the impedance test when the HIGH IMPEDANCE VALUES message appears, your test results may not be accurate.

**OR**

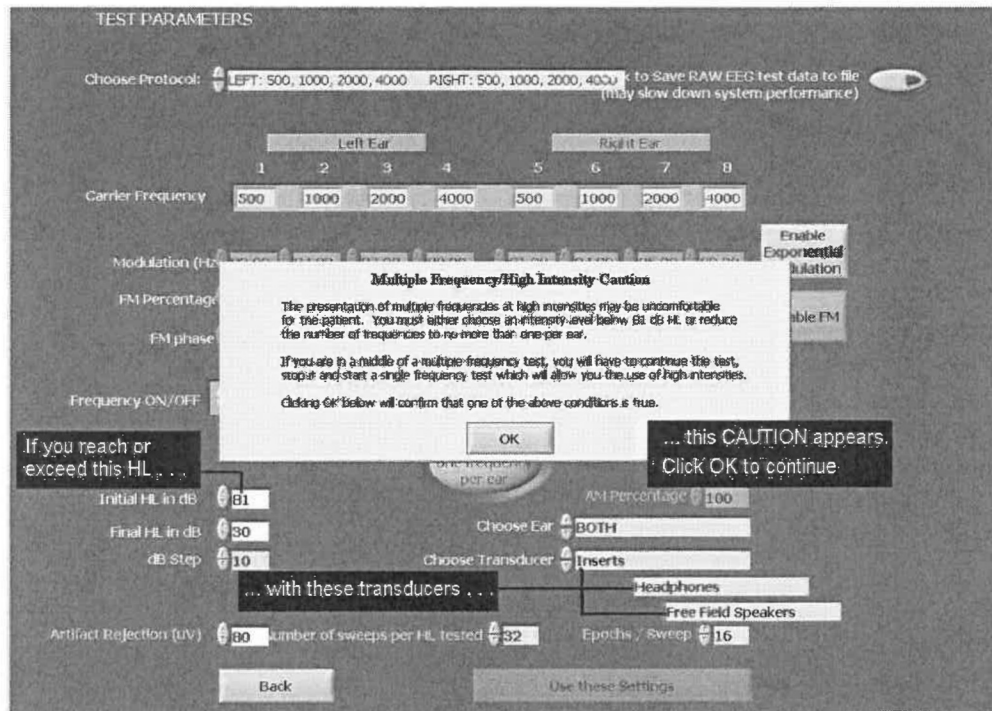
6. Reapply the electrodes if the “HIGH IMPEDANCE VALUES!” message appears.
7. Select (click on) the CONTINUE IMPEDANCE TEST command button.  
You can continue an impedance test that shows values within the impedance limits.
8. Repeat the impedance test until the values are satisfactory.
9. Select (click on) the EXIT impedance test command button.  
This ends the impedance test and closes the Impedance test in progress dialog box.

### ***Handling High and Maximum Intensity conditions***

The MASTER program alerts you when you use high-intensities during tests. Verification, Caution, and Warning messages appear whenever you operate the equipment at high, near maximum, or maximum frequencies. These messages differ and appear at different times depending on the transducer that you use.



## Using the Inserts, Headphones, or Free Field Speakers Transducers



The MASTER program uses 80 dB HL as the maximum intensity that you can use when you present 4 frequencies per ear. Warning and Caution messages appear when you exceed this. To clear these messages and continue testing, follow these steps:

### — Displaying and Handling the Multiple Frequency/High Intensity Caution message

To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Inserts, Headphones, or Free Field Speakers.

|  |                                                                                                                                                                                                                                      |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>CAUTION</b></p> <p>When you exceed 80 dB, the MASTER program displays the Multiple Frequency/High Intensity Caution Message. If this message appears, select (click on) the OK command button.</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

2. Select (click on) the spin button next to the Initial HL in dB field until the value reaches 80

**OR**

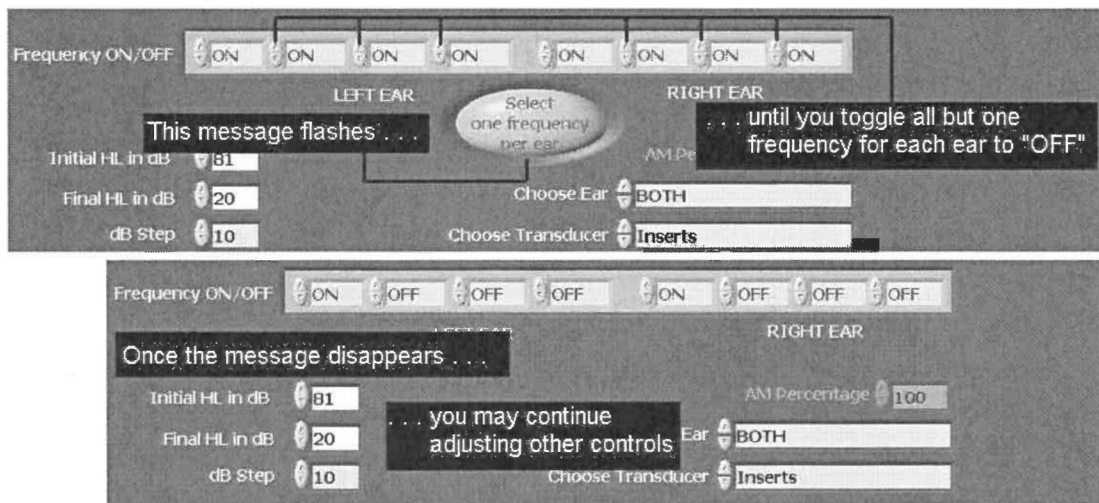
3. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.



### WARNING

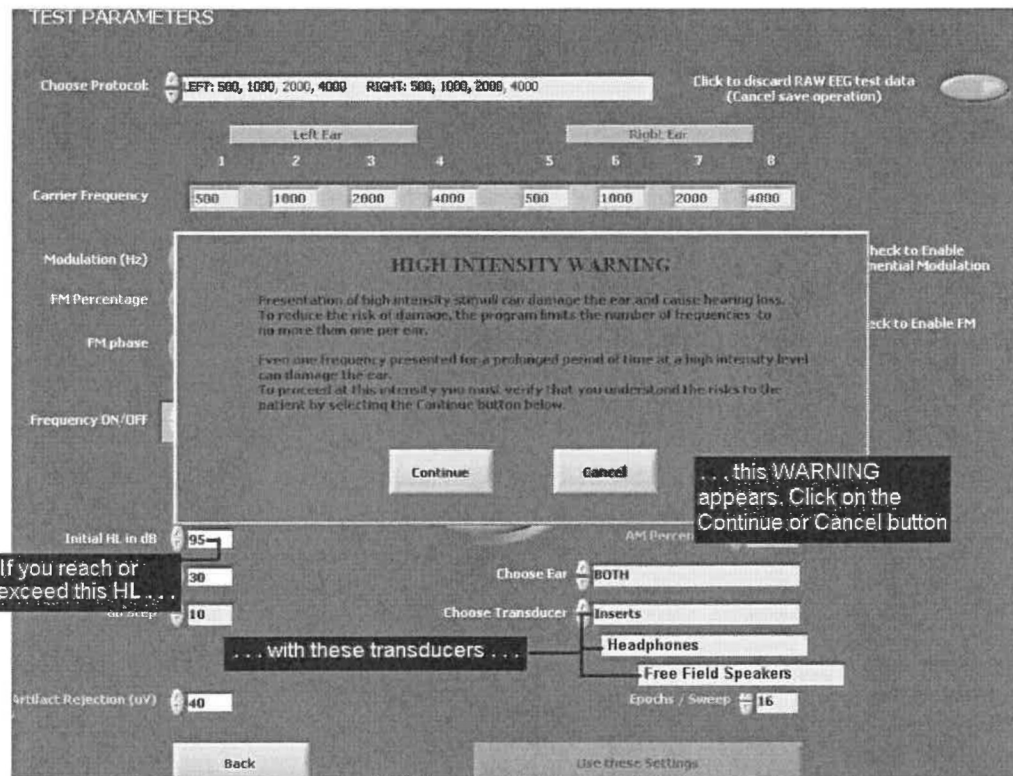
If you enter a value greater than 92, the MASTER program displays the HIGH INTENSITY WARNING MESSAGE. If this message appears, select (click on) the Cancel command button in that message and read the Displaying and Handling the High Intensity Warning message section of this document before you continue. After you read the Displaying and Handling the High Intensity Warning message section if questions or problems arise, stop the test immediately and make contact with Bio-logic Systems Corp. Customer Service at 1-800-272-8075.

4. Use the computer's keyboard to enter a value between 81 and 92 (see **WARNING** if you accidentally enter a value greater than 92).  
The Multiple Frequency/High Intensity Caution message appears.
5. Click on the OK command button in the Multiple Frequency/High Intensity Caution message.  
This closes the Caution message and displays a screen with a flashing "Select one frequency per ear" message.



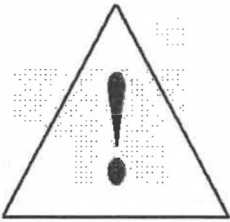
6. Select (click on) the spin button ON/OFF toggles until you set all but one frequency for each ear OFF.  
This closes the "Select one frequency per ear" message.

— *Displaying and Handling the High Intensity Warning message*



To display and handle this message:

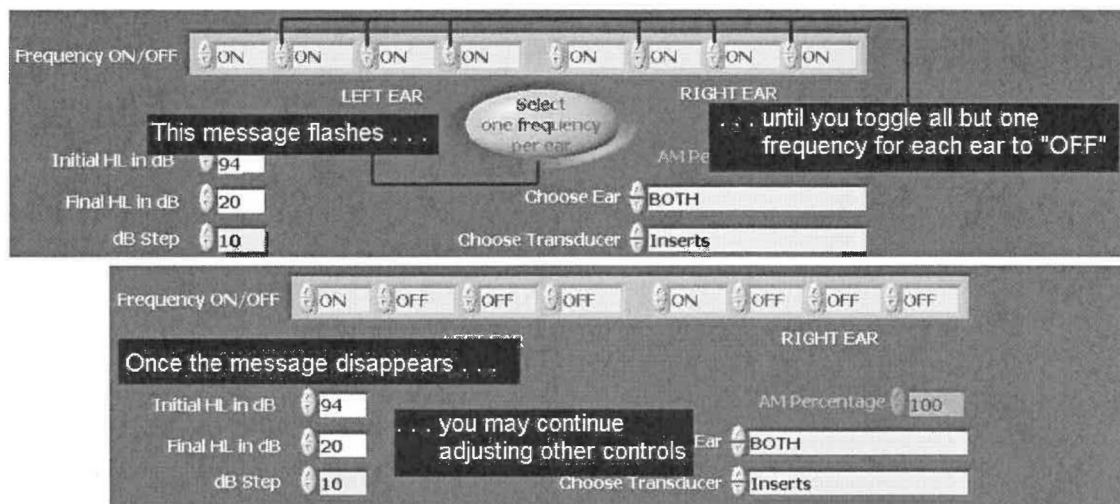
1. Select (click on) the spin button next to the Choose Transducer field until the field shows Inserts, Headphones, or Free Field Speakers.
2. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>WARNING</b></p> <p>If you enter a value greater than 92, the MASTER program displays the HIGH INTENSITY WARNING MESSAGE. If this message appears, select (click on) the Cancel command button in that message and read the <u>Displaying and Handling the High Intensity Warning message</u> section of this document before you continue. After you read the Displaying and Handling the High Intensity Warning message section if questions or problems arise, stop the test immediately and make contact with Bio-logic Systems Corp. Customer Service at 1-800-272-8075.</p> |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

3. Use the computer's keyboard to enter a value greater than 93.  
The High Intensity Warning message appears.



## ADDITIONAL OPERATING PROCEDURES



4. Select (click on) the Continue command button.  
This closes the Warning message and displays a screen with a flashing "Select one frequency per ear" message.

**Note:** The "Select one frequency per ear" appears every time you exceed 80 dB—whether you use the spin buttons or your computer keyboard to do so.

5. Select (click on) the spin button ON/OFF toggles until you set all but one frequency for each ear OFF.  
This closes the flashing "Select one frequency per ear" message.

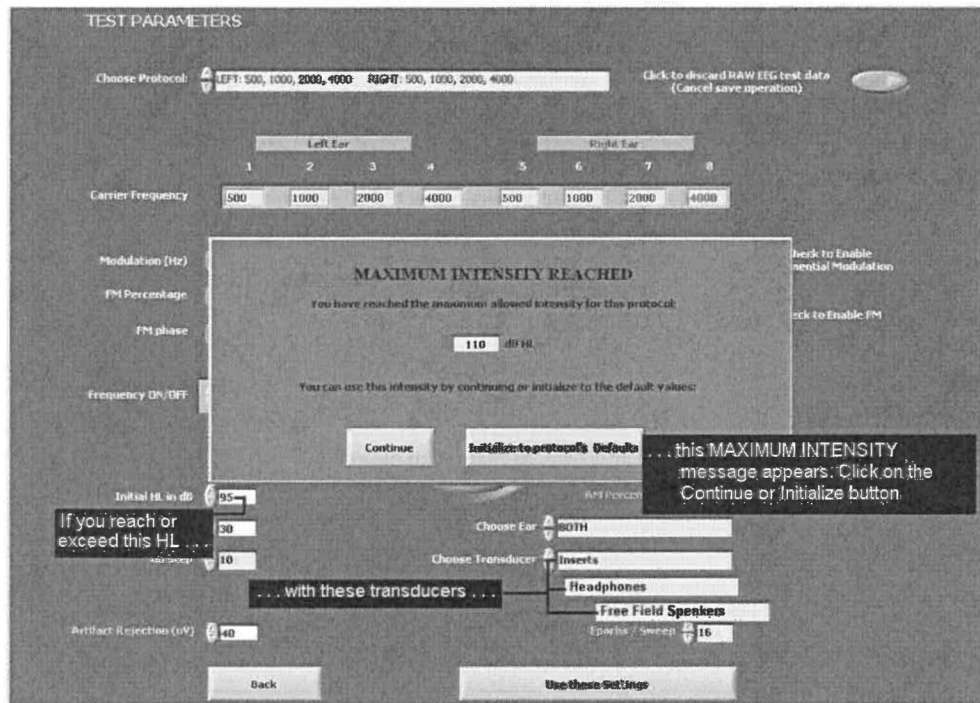
**OR**

6. Select (click on) the Cancel command button on the HIGH INTENSITY WARNING message.  
This closes the Warning message, displays a screen with a flashing "Select one frequency per ear" message, and places a text cursor in the Initial HL in dB field.
7. Select (click on) the spin button next to the Initial HL in dB field until the value falls below 81.  
This closes the flashing "Select one frequency per ear" message.

**Note:** The High Intensity Warning Message does not prevent you from delivering the intensity you want (or even higher intensities). However, prolonged exposure to high output signals can damage hearing. Users must select the "Continue" command button to acknowledge that they understand and accept the risk.



— *Displaying and Handling the Maximum Intensity message*



The MASTER program places a maximum on the intensity of the HL that you can use based on transducer calibration and frequency delivered. When you reach that maximum, it displays a Maximum Intensity message. To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Inserts, Headphones, or Free Field Speakers.
2. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.
3. Use the computer's keyboard to enter 108 or some larger number.  
The Maximum Intensity Reached message appears.
4. Select (click on) the Continue command button.  
This closes the Maximum Intensity Reached message, places the maximum intensity value in the HL in dB field, and often displays the High Intensity Warning message.
5. Follow the steps in the Displaying and Handling the High Intensity Warning message section (for Inserts and Headphones) of this document.

OR

6. Select (click on) the Cancel command button.  
This closes the Maximum Intensity Reached message, returns you to the Test Parameters screen, and sets the value in the Initial HL in dB field to the system default (60).

## Notes

Use this page for your own notes.

## Using Ear Muffins® or Bone Oscillators

When using the Ear Muffin disposable couplers on an infant's ear, be sure to select the "Ear Muffin" as the transducer. Using the correct setting makes sure of the proper calibration table and the correct stimulus intensity. Otherwise, the actual delivered intensity may be too high or too low. For the Ear Muffin, corrections to reach equivalent dB HL values are larger than those for most other transducers. This means that if you select "Ear Muffin" in the software, but actually use regular in-the-ear inserts on the subject's ears, you deliver a much louder (about 20 db louder) stimulus than the HL value indicates. You may, in fact, be delivering an uncomfortably loud or potentially damaging stimulus. Therefore, when you reach a 63 dB setting, the MASTER program displays an Ear Muffin/Bone Conduction Verification message. To clear that message and continue testing, follow the steps in these sections:

Displaying and Handling the Ear Muffin Verification message

Displaying and Handling the Maximum Intensity Reached message

— *Displaying and Handling the Ear Muffin Verification message*

**TEST PARAMETERS**

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000 Click to discard RAW EEG test data (Cancel save operation)

Left Ear Right Ear

Carrier Frequency 500 1000 2000 4000 500 1000 2000 4000

Modulation (Hz)

FM Percentage

FM phase

Frequency ON/OFF

**EAR MUFFIN/BONE CONDUCTION VERIFICATION**

Please verify that you are using Ear Muffins/Bone Conduction on this patient to deliver the stimulus.

If you are using regular in-the-ear inserts or headphones, the actual stimulus intensity that will be presented may be uncomfortable for the patient or could cause damage to the ears. If Ear Muffins are not actually being used on this patient you should select the correct transducer setting before proceeding.

Are you sure that you are using Ear Muffins/Bone Conduction?

Yes No

... this verification message appears. Click Yes to continue with Ear muffins. Click No to switch to another transducer.

Initial HL in dB 63

If you reach or exceed this HL ...

Choose Ear BOTH

Choose Transducer Ear Muffins

... with this transducer ...

Artifact Rejection (uV) 40

Epochs / Sweep 16

Back Use these Settings

To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Ear Muffins.
2. Select (click on) the spin button next to the Initial HL in dB field until the value reaches 63.

**OR**

3. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.



4. Use the computer's keyboard to enter a value from 63 to 77.  
The Ear Muffin Verification message appears.

**NOTE:** Entering 78 or any greater value launches the Maximum Intensity Reached message. To clear that message, see the Displaying and Handling the Maximum Intensity Reached message section of this document.

5. Select (click on) the Yes command button.  
This closes the Ear Muffin Verification message, returns you to the Test Parameters screen, and lets you continue to set up the MASTER test.

**OR**

6. Select (click on) the No command button.  
This closes the Ear Muffin Verification message.

**THEN**

7. Select (click on) the spin button next to the Choose Transducer field until the field shows the transducer that you want to use.

— *Displaying and Handling the Maximum Intensity Reached message*

TEST PARAMETERS

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000 Click to discard RAW EEG test data (Cancel save operation)

Carrier Frequency: 500 1000 2000 4000

Modulation (Hz)

FM Percentage

FM phase

Frequency ON/OFF

Initial HL in dB: 91

If you reach or exceed this HL ... 30 10

Choose Ear: BOTH

Choose Transducer: Ear Muffs

Artifact Rejection (uV): 40

Epochs / Sweep: 16

Back Use these Settings

**MAXIMUM INTENSITY REACHED**

You have reached the maximum allowed intensity for this protocol:

90 dB HL

You can use this intensity by continuing or initialize to the default values:

Continue Initialize to protocol's Defaults

... this MAXIMUM INTENSITY message appears. Click the Continue or Initialize to protocol's defaults button.

... with this transducer ...

To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Ear Muffs.
2. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.
3. Use the computer's keyboard to enter 78 or some larger number.  
The Maximum Intensity Reached message appears.

**Note:** In all cases, the Maximum Intensity Reached message appears at values dependent on the transducer selected, the specific frequencies presented, and the number of frequencies presented.

4. Select (click on) the Continue command button on the Maximum Intensity Reached message. This closes the Maximum Intensity Reached message and the Ear Muffin verification message appears (if Ear Muffins are the selected transducer). See the Displaying and Handling the Ear Muffin Verification message section of this document for details. We repeat the procedural steps from that section for your convenience:

—Select (click on) the Yes command button on the Ear Muffin Verification message. This closes the Ear Muffin Verification message, returns you to the Test Parameters screen, and lets you continue to set up the MASTER test.

**OR**

—Select (click on) the No command button. This closes the Ear Muffin Verification message.

**THEN**

—Select (click on) the spin button next to the Choose Transducer field until the field shows the transducer that you want to use.

**OR**

5. Select (click on) the Initialize to Defaults command button. This closes the Maximum Intensity Reached message, returns you to the Test Parameters screen, and sets the value in the Initial HL In dB field to the system default (60).

## Notes

Use this page for your own notes



## ***Bone Conduction set-up***

To use the Bone Conduction transducer, you must connect the Bone Oscillator to the small, purple-rimmed receptacle on the right of the Navigator® Pro.

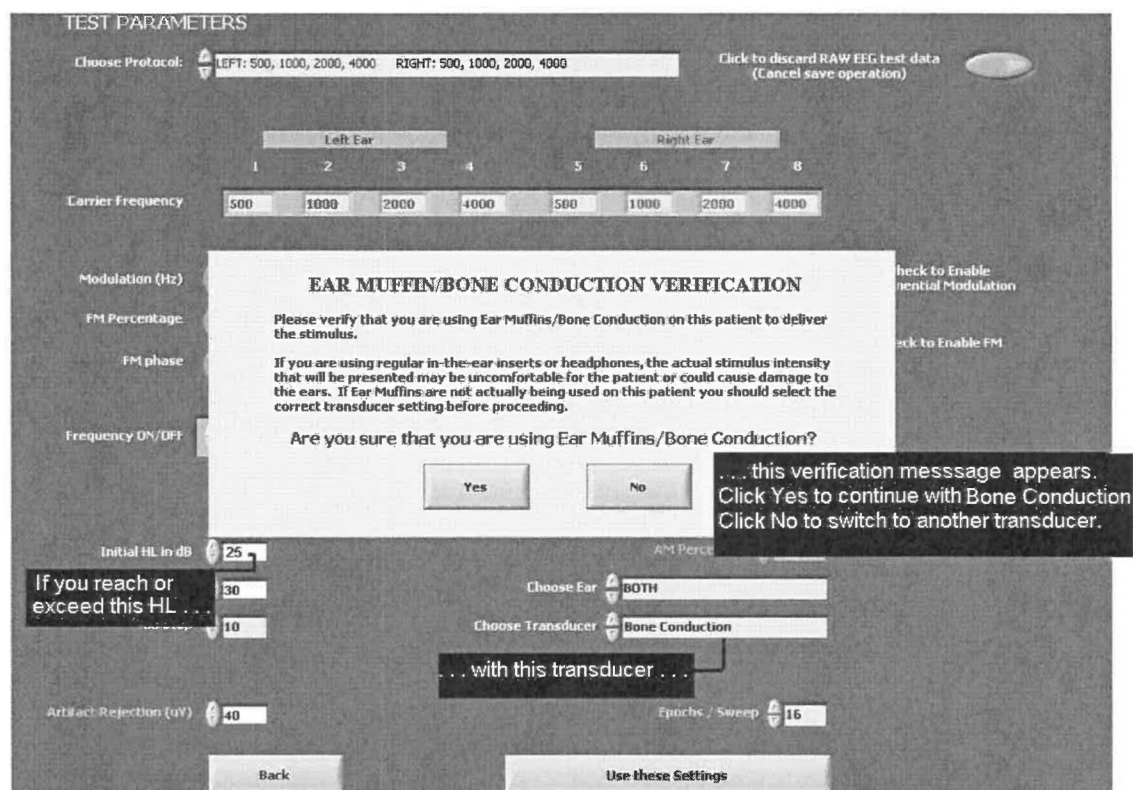
## **Using the Bone Conduction transducer**

When using the Bone Conduction transducer, be sure to select "Bone Conduction" as the transducer. Using the correct setting makes sure of the proper calibration table and the correct stimulus intensity. Otherwise, actual delivered intensity may be too high or too low. For the Bone Conduction, corrections to reach equivalent dB HL values are larger than those for most other transducers. This means that if you select "Bone Conduction" in the software, but actually use regular in-the-ear inserts on the subject's ears, you deliver a much greater stimulus than the HL value indicates. You may, in fact, be delivering an uncomfortable or potentially damaging stimulus. Therefore, when you reach a 31 dB setting, the MASTER program displays an Ear Muffin/Bone Conduction Verification message. To clear that message and continue testing, follow the steps in these sections:

Displaying and Handling the Bone Conduction Verification message

Displaying and Handling the Maximum Intensity Reached message

— *Displaying and Handling the Bone Conduction Verification message*



To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Bone Conduction.
  2. Select (click on) the spin button next to the Initial HL in dB field until the value reaches 25.
- OR**
3. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.

4. Use the computer's keyboard to enter a value between 25 and 55.  
The Ear Muffin/Bone Conduction Verification message appears.

**NOTE: Entering 55 or any greater value launches the Maximum Intensity Reached message. To clear that message, see the Displaying and Handling the Maximum Intensity Reached message section of this document**

5. Select (click on) the Yes command button.  
This closes the Ear Muffin/Bone Conduction Verification message and launches the Ear to Mask sequence. See the Using the Ear to Mask sequence section of this document.

**OR**

6. Select (click on) the No command button.  
This closes the Ear Muffin/Bone Conduction Verification message and launches the Ear to Mask sequence. See the Using the Ear to Mask sequence section of this document.

**THEN**

7. Select (click on) the spin button next to the Choose Transducer field until the field shows the transducer that you want to use.

— *Displaying and Handling the Maximum Intensity Reached message*

**TEST PARAMETERS**

Choose Protocol: LEFT: 500, 1000, 2000, 4000 RIGHT: 500, 1000, 2000, 4000 Click to discard RAW EEG test data (Cancel save operation)

Carrier Frequency: 500 1000 2000 4000 500 1000 2000 4000

Modulation (Hz): 500 1000 2000 4000

FM Percentage: 50

FM phase: 180

Frequency ON/OFF: 500

**MAXIMUM INTENSITY REACHED**

You have reached the maximum allowed intensity for this protocol.

S4 dB HL

You can use this intensity by continuing or initialize to the default values:

Continue Initialize to protocol's Defaults

Initial HL in dB: 54

Choose Ear: BOTH

Choose Transducer: Bone Conduction

Artifact Rejection (uV): 40

Epochs / Sweep: 16

Back Use these Settings

To display and handle this message:

1. Select (click on) the spin button next to the Choose Transducer field until the field shows Bone Conduction.
2. Select (click on) the Initial HL in dB field.  
This places a mouse cursor in the field.
3. Use the computer's keyboard to enter 56 or some larger number.  
The Maximum Intensity Reached message appears.

**Note:** In all cases, the Maximum Intensity Reached message appears at values dependent on the transducer selected, the specific frequencies presented, and the number of frequencies presented.



4. Select (click on) the Continue command button on the Maximum Intensity Reached message. This closes the Maximum Intensity Reached message and the Bone Conduction Verification message appears. See the Displaying and Handling the Bone Conduction Verification message section of this document for details. We repeat the procedural steps from that section for your convenience:

— Select (click on) the Yes command button.

This closes the Ear Muffin/Bone Conduction Verification message and launches the Ear to Mask sequence. See the Using the Ear to Mask sequence section of this document.

**OR**

— Select (click on) the No command button.

This closes the Ear Muffin/Bone Conduction Verification message and launches the Ear to Mask sequence. See the Using the Ear to Mask sequence section of this document.

**THEN**

—Select (click on) the spin button next to the Choose Transducer field until the field shows the transducer that you want to use.

**OR**

5. Select (click on) the Initialize to Defaults command button.  
This closes the Maximum Intensity Reached message, launches the Ear to Mask sequence, and sets the value in the Initial HL in dB field to the system default (40).

— Using the Ear-to-Mask sequence

Choose your preference for masking below.  
If you choose to mask, be sure that the correct transducer is securely placed on the ear you wish to mask.

**Masking Intensity**

1. Click on one of these radio buttons ...

2. ... to activate these controls

3. Type value here, OR ...

4. ... Use these spin buttons to reach value you want

**Masked Ear**

**Masking Transducer**

OK

☒ Do not mask

☐ Set masking level to 40 dB HL

☐ Set and maintain masking level at -40 dB relative to the stimulus level

☒ Left

☐ Right

☒ Insert Earphone

☐ Ear Muffs

☐ Headphones

please note:  
opposite ear to be  
the ability to change

In order to change the Ear stimulated you must select a different  
transducer first and then select Bone Conduction again.

When you are ready to start a test with the Bone Conduction transducer, the MASTER program leads you through a sequence that lets you define the ear that you want to mask during the test. To reach and use this sequence of screens:

1. Follow the steps in the Configuring protocols for a test: the Test Parameters screen section of this document.
2. Make sure that the Choose Transducer field reads Bone Conduction.  
The MASTER program starts the Ear-to-Mask sequence after you verify the Bone Conduction transducer.
3. Click the radio button next to the masking control that you want to use as follows:

Choose your preference for masking below.  
If you choose to mask, be sure that the correct transducer is securely placed on the ear you wish to mask.

**Masking Intensity**

1. Click on one of these radio buttons...

2. ... to activate these controls.

3. Type value here OR ...

4. ... Use these spin buttons to reach value you want

**Masked Ear**

**Masking Transducer**

OK

please note: opposite ear to be able to change

In order to change the Ear stimulated you must select a different transducer first and then select Bone Conduction again.

- a. Click the radio button next to **Do not mask** to omit a masking intensity.
- OR**
- b. Click the radio button next to **Set masking level to** to activate the db HL data entry field.
- AND**
- c. Type the masking intensity you want in that field.
- OR**
- d. Use the spin buttons to increment (up arrow) or decrement (down arrow) to the masking intensity you want.

- e. Click the radio button next to **Set and maintain masking level at** to activate the db relative to stimulus level data entry field.

**Note: The program automatically delivers masking to the selected ear at a level that is 40 dB lower than the stimulus intensity level.**

- f. Type the masking intensity you want in that field.

**OR**

- g. Use the spin buttons to increment (up arrow) or decrement (down arrow) to the masking intensity you want.

The screenshot shows a dialog box titled "Choose your preference for masking below. If you choose to mask, be sure that the correct transducer is securely placed on the ear you wish to mask." It contains three sections: "Masking Intensity" with three radio buttons (Do not mask, Set masking level to 40 dB HL, and Set and maintain masking level at -40 dB relative to the stimulus level), "Masked Ear" with two radio buttons (Left and Right), and "Masking Transducer" with three radio buttons (Insert Earphone, Ear Muffs, and Headphones). An "OK" button is at the bottom right. Two callout boxes with arrows point to the "Masked Ear" and "Masking Transducer" sections, each containing the text: "Click one of these radio buttons to select the [ear/transducer] you want to mask."

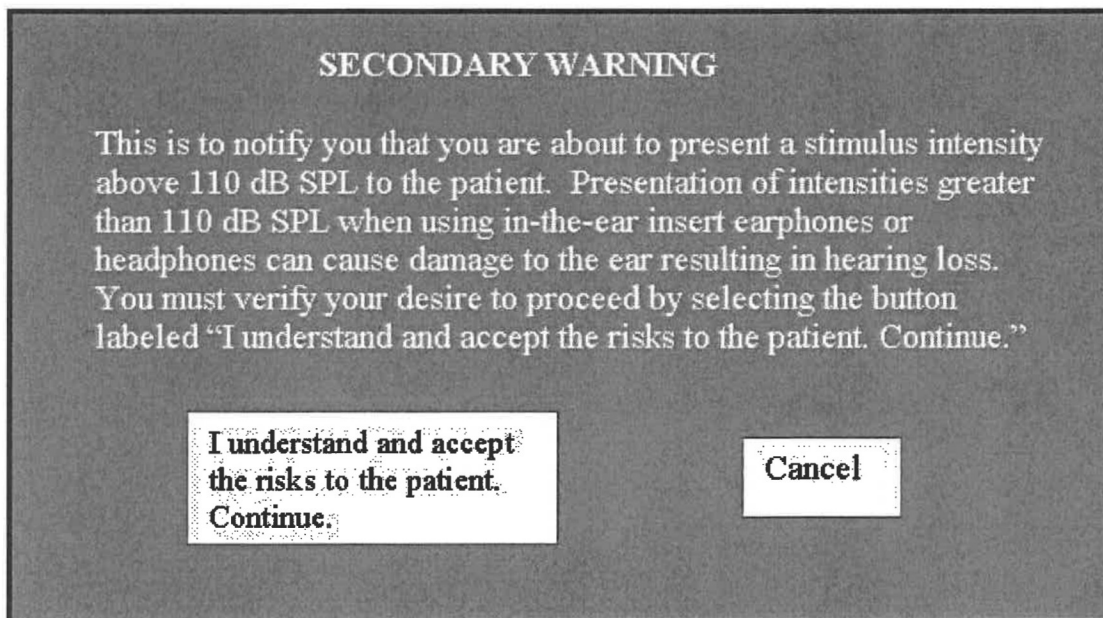
4. Select (click on) the radio button next to the ear you want to mask. A bullet appears in that radio button.
5. Select (click on) the radio button next to the transducer that you want to use. A bullet appears in that radio button.
6. Select (click on) the OK command button.

This closes the Ear-to-Mask screen and returns you to the Test parameters screen.

7. You may now continue the test.



## Secondary Warning message (for all transducers)



In some instances the user may need to present stimulus intensities that, if used improperly, can cause damage to the patient's ears. The software and hardware display messages before presenting high intensity signals. However, it is the user's responsibility to use these intensities only on appropriate patients and with caution—just as when using other audiometric devices that are capable of high output.

The SECONDARY WARNING message (see above) is evoked by the hardware each time an intensity of 110 dB SPL is about to be delivered through the transducer. To clear this message::

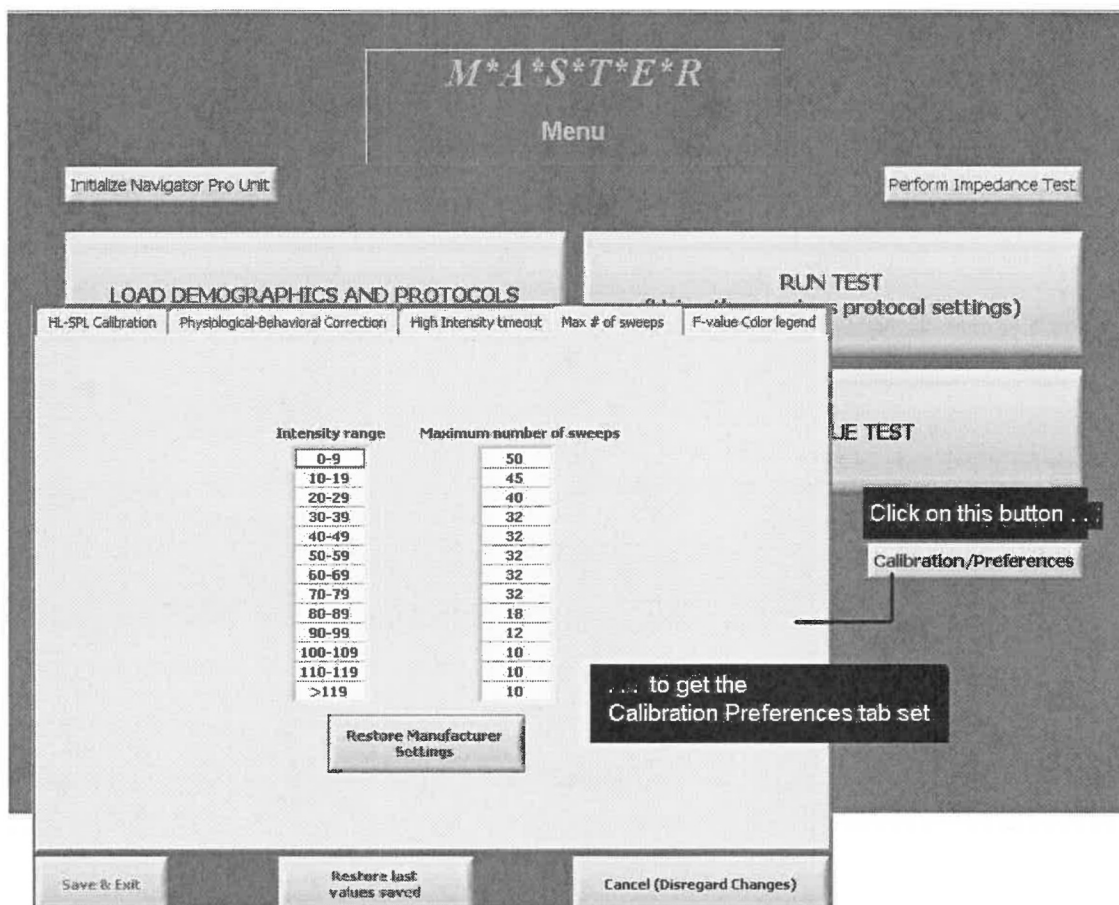
1. Select (click on) the “I understand and accept the risks to the patient. Continue.” Command button.  
This closes the Secondary Warning message and lets you continue the MASTER test with the frequency you have set.

|  |                                                                                                                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>IMPORTANT!</b></p> <p><b>This product is capable of delivering very high intensity stimuli to the patient's ear. These can damage hearing if used improperly. Therefore, it is intended for use only by trained professionals who understand how to administer the test safely.</b></p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

OR

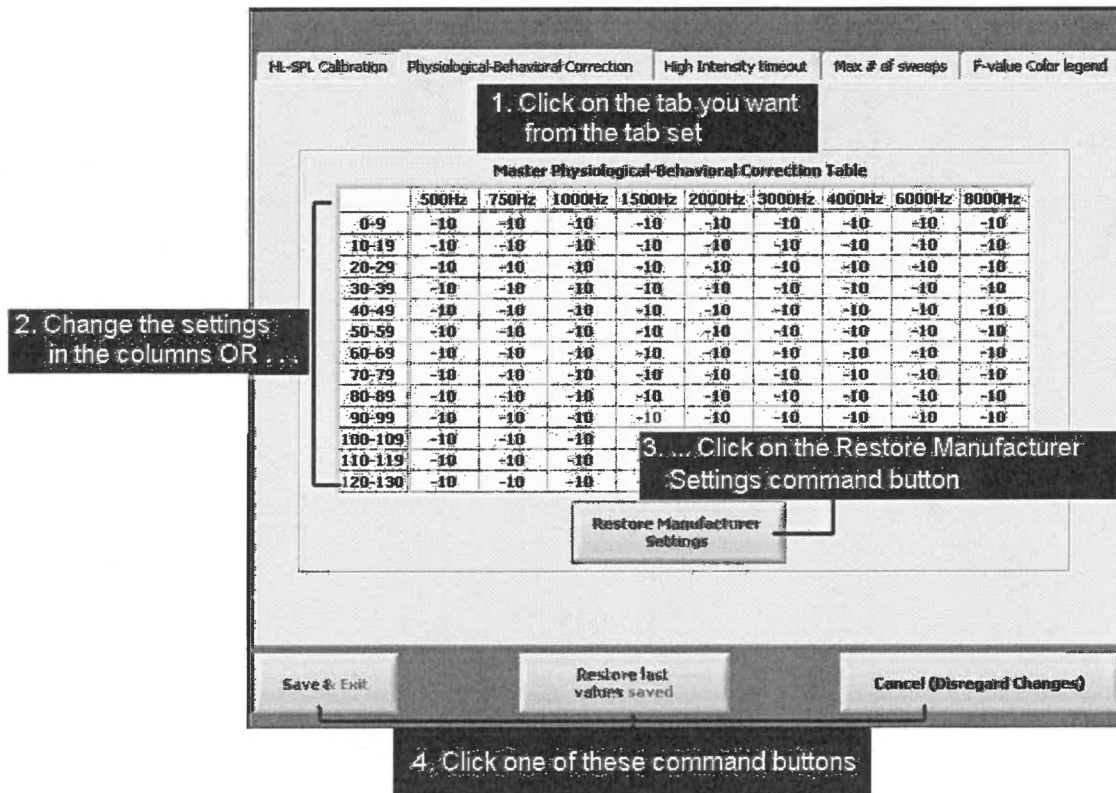
2. Select (click on) the Cancel command button.  
This closes the Secondary Warning message and returns you to the Test Parameters screen. There, you can continue to set up the MASTER test.

## How to use the Calibration Preferences tabs set



The MASTER program uses dB SPL correction values to achieve dB HL readings. These values vary depending on the transducer that you use. The Calibration Preferences tabs set lets you adjust these correction values to meet your needs or use the manufacturer's settings. To use the Calibration Preferences tabs set:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Calibration Preferences command button.  
The Calibration Preferences tabs set appears.



3. Select (click on) the tab that you want from the tab set.

**Note: Procedures for the HL SPL Calibration tab, the Physiological-Behavioral Correction tab, and the Maximum # of Sweeps tab are very similar. The steps that follow present operating procedures that are applicable to each of these tabs.**

4. Select (click on) the cell in the tab that contains the setting that you want to change. This places a text cursor in that cell.
5. Use your computer's keyboard to change the value in the cell.
6. Repeat these steps for any other settings you want to change.

**OR**

7. Select (click on) the Restore Manufacturer's Settings command buttons. This aborts any changes you have made and restores settings chosen by the manufacturers.
8. Select (click on) the Save & Exit command button. This saves any changes you have made and closes the Calibration Preferences tab set.

**OR**

9. Select (click on) the Restore last values saved command buttons. This aborts any changes you have made and restores settings from the last test.

**OR**

10. Select (click on) the Cancel (Disregard Changes) command button. This closes the Calibration Preferences tab set without making any changes.



## Using the High Intensity timeout tab

High Intensity timeout

**1. Type values into these fields, AND ...**

Prolonged high Intensity stimulation can damage hearing. You can enable a maximum duration that the stimulus will remain on and a time-out duration before the stimulus and averaging resume automatically. Disabling these settings will cause the stimulus to continue until the recording is terminated manually or based on the stopping criteria.

| Enable                              | Intensity (dB HL) | Max. Time On (min) | Time Off (min) |
|-------------------------------------|-------------------|--------------------|----------------|
| <input type="checkbox"/>            | 120-129           |                    |                |
| <input type="checkbox"/>            | 110-119           |                    |                |
| <input checked="" type="checkbox"/> | 100-109           | 1.55               | 2.05           |
| <input type="checkbox"/>            | 90-99             |                    |                |
| <input type="checkbox"/>            | 80-89             |                    |                |
| <input type="checkbox"/>            | 70-79             |                    |                |

Note:  
To enable a specific time ON/OFF range, enter desired values into the appropriate areas and only then check corresponding ENABLE control which will save these values

**2. ... Click on a corresponding checkbox to activate (checkmark appears)**

Restore Manufacturer Settings

The High Intensity timeout tab differs from the other tabs in the Calibration Preferences tab set. It lets you set a maximum duration for a high intensity stimulus. This means that the MASTER program automatically stops the stimulus after the time period you set has elapsed. This tab also lets you set a “timer” that automatically restarts the high intensity stimulus. To use this tab and its controls, follow these steps:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Calibration Preferences command button.  
The Calibration Preferences tabs set appears.
3. Select (click on) the High Intensity timeout tab to bring it to the “top” of the stack of tabs.
4. Click on the field you want under the **Max. Time On (min)** column.  
Choose the field next to the **Intensity (dB HL)** you want to control. This places a text cursor in that field.
5. Type in the maximum amount of time that you want the MASTER program to deliver the **Intensity (dB HL)** during the test.
6. Click on the field you want under the **Time Off (min)** column.  
Choose the field next to the **Intensity (dB HL)** you want to control. This places a text cursor in that field.



High Intensity timeout

**1. Type values into these fields, AND ...**

Prolonged high intensity stimulation can damage hearing. You can enable a maximum duration that the stimulus will remain on and a time-out duration before the stimulus and averaging resume automatically. Disabling these settings will cause the stimulus to continue until the recording is terminated manually or based on the stopping criteria.

| Enable                              | Intensity (dB HL) | Max. Time On (min) | Time Off (min) |
|-------------------------------------|-------------------|--------------------|----------------|
| <input type="checkbox"/>            | 120-129           |                    |                |
| <input type="checkbox"/>            | 110-119           |                    |                |
| <input checked="" type="checkbox"/> | 100-109           | 1.55               | 2.05           |
| <input type="checkbox"/>            | 90-99             |                    |                |
| <input type="checkbox"/>            | 80-89             |                    |                |
| <input type="checkbox"/>            | 70-79             |                    |                |

Note:  
To enable a specific time ON/OFF range, enter desired values into the appropriate areas and only then check corresponding ENABLE control which will save these values

**2. ... Click on a corresponding checkbox to activate (checkmark appears)**

**Restore Manufacturer Settings**

7. Type in the amount of time that you want the MASTER program to wait before restarting the **Intensity (db HL)**.
8. Repeat these steps for as many **Intensity (db HL)** levels as you wish.
9. Select (click on) the **Enable** check box next to the High Intensity timeouts you want to activate until a checkmark appears,

This saves the values you have entered. If you activate an **Enable** checkmark before you set **Max. Time ON (min)** or **Time Off (min)** values, the program prompts you to set either or both.

**OR**

10. Select (click on) the Restore Manufacturer's Settings command buttons.  
This aborts any changes you have made and restores settings chosen by the manufacturers.
11. Select (click on) the Save & Exit command button.  
This saves any changes you have made and closes the Calibration Preferences tab set.

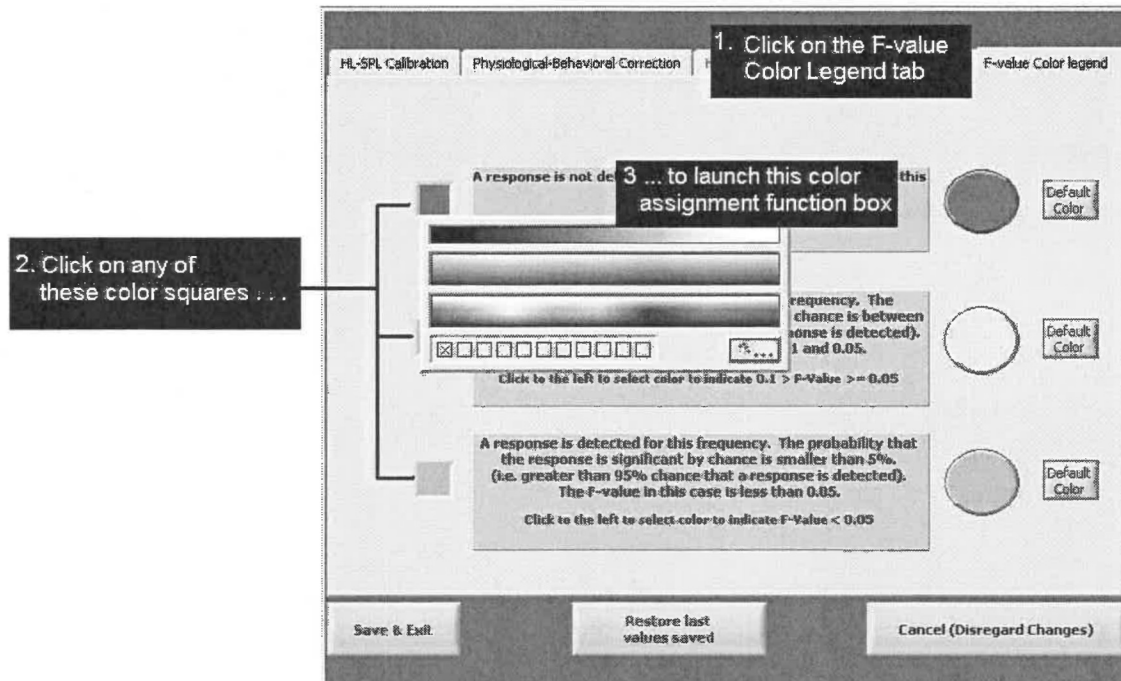
**OR**

12. Select (click on) the Restore last values saved command buttons.  
This aborts any changes you have made and restores settings from the last test.

**OR**

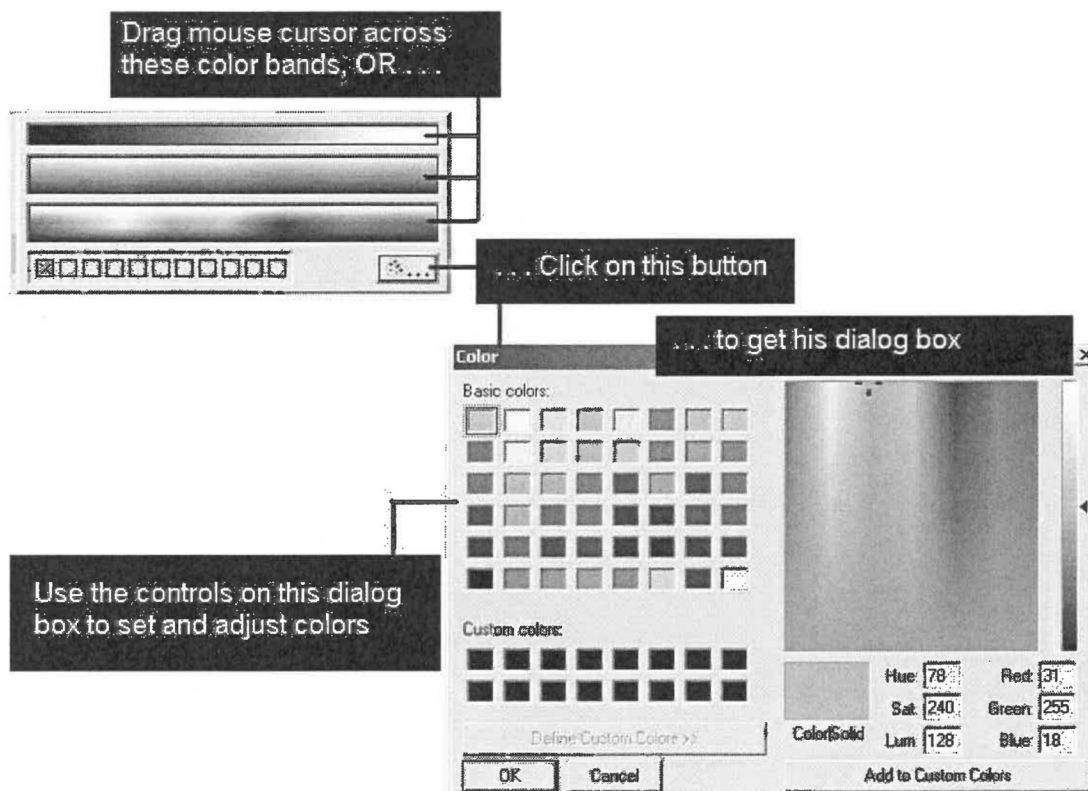
13. Select (click on) the Cancel (Disregard Changes) command button.  
This closes the Calibration Preferences tab set without making any changes.

## Using the F-value Color Legend tab



The F-value Color Legend tab differs from the other tabs in the Calibration Preferences tab set. It lets you define the color associated with the three (3) levels of F-values. To use this tab and its controls, follow these steps:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Calibration Preferences command button.  
The Calibration Preferences tabs set appears.
3. Select (click on) the F-value Color Legend tab.
4. Select (click on) any of the color squares next to any of the F-values.  
A color setting function box appears.



5. Drag your mouse cursor across the color bands to set hue, shade, and intensity for the color you want to associate with the F-value you have chosen.

OR

6. Click on the  button.  
This launches a Color setting dialog box.
7. Use the controls on Color setting dialog box to specify the color you want.

**Note:** The Microsoft® Corporation has thoroughly documented dialog boxes of this type. For descriptions and step-by-step operating instructions, please consult the documentation that came with your Windows™ operating system.

8. Select (click on) the Save & Exit command button.  
This saves any changes you have made and closes the Calibration Preferences tab set.

OR

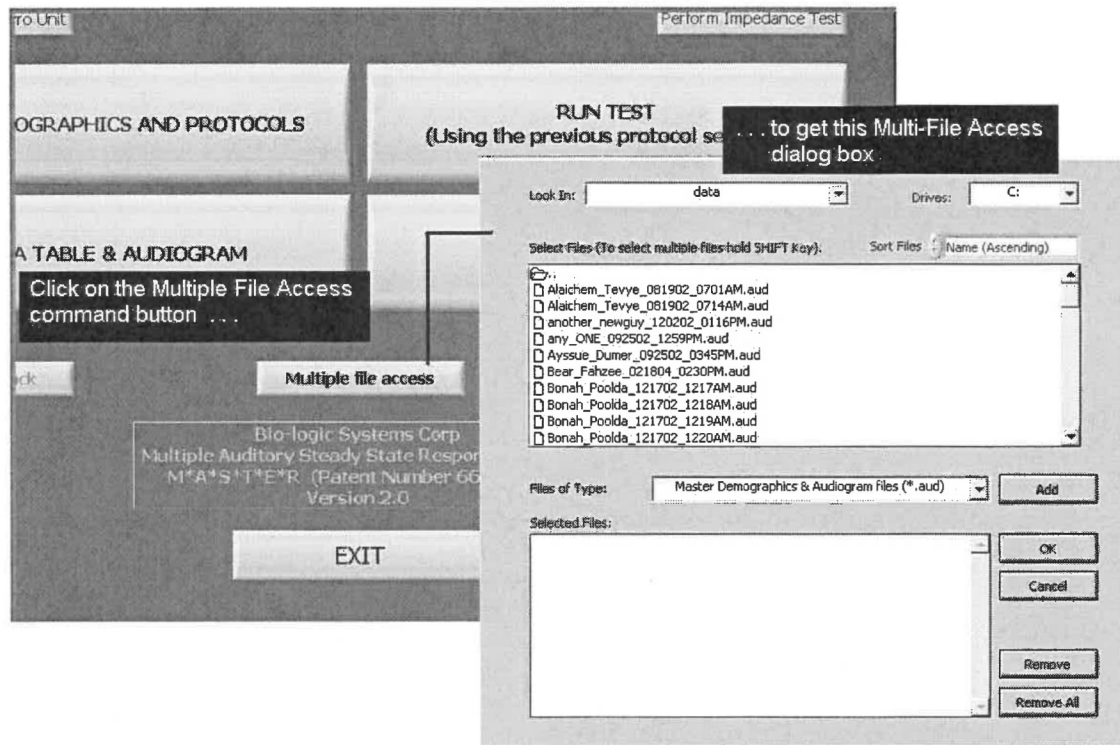
9. Select (click on) the Restore last values saved command buttons.  
This aborts any changes you have made and restores settings from the last test.

OR

10. Select (click on) the Cancel (Disregard Changes) command button.  
This closes the Calibration Preferences tab set without making any changes.



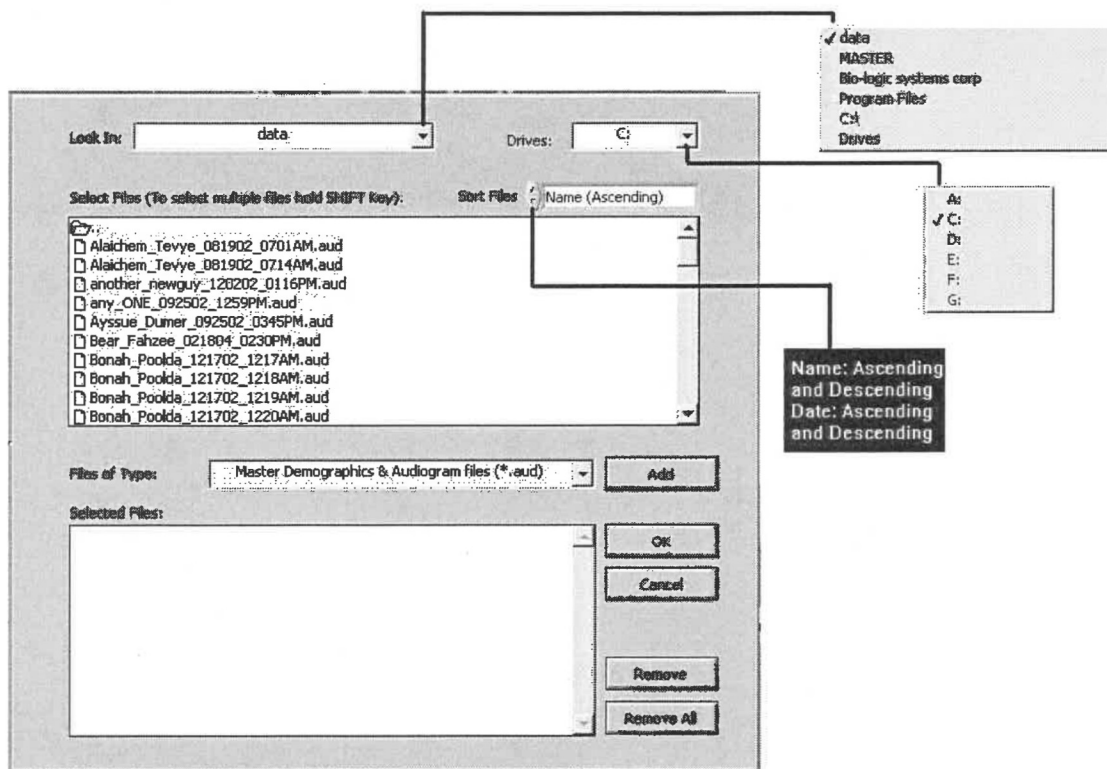
## How to use the Multiple File Access dialog box



The Multiple File Access screen lets you select as many as 6 files of each type (air conduction, bone conduction, and sound field) for simultaneous display in the statistics table. In this way, the program can generate a single audiogram from multiple tests or files. To launch and use this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Multiple File Access command button.  
The Multiple File Access dialog box appears.





3. Select (click on) the arrow in the Drive field.  
A list of the Disk Drives available in your system appears. Each drive is designated by a letter. If you need more information regarding disk drives, please make contact with Bio-logic Systems Corp.
4. Select (click on) a Drive from that list.  
The Drive you choose appears in the Drive field.
5. Select (click on) the arrow in the Look in field.  
A list of locations appears. These locations show you where the MASTER program can look to find test files.
6. Select (click on) a location from the list.  
The location you choose appears in the Look in field and the test files in that location appear in the Select Files area.

7. Select (click on) the spin button next to the Sort Files field to step through the sorting possibilities. These possibilities are:

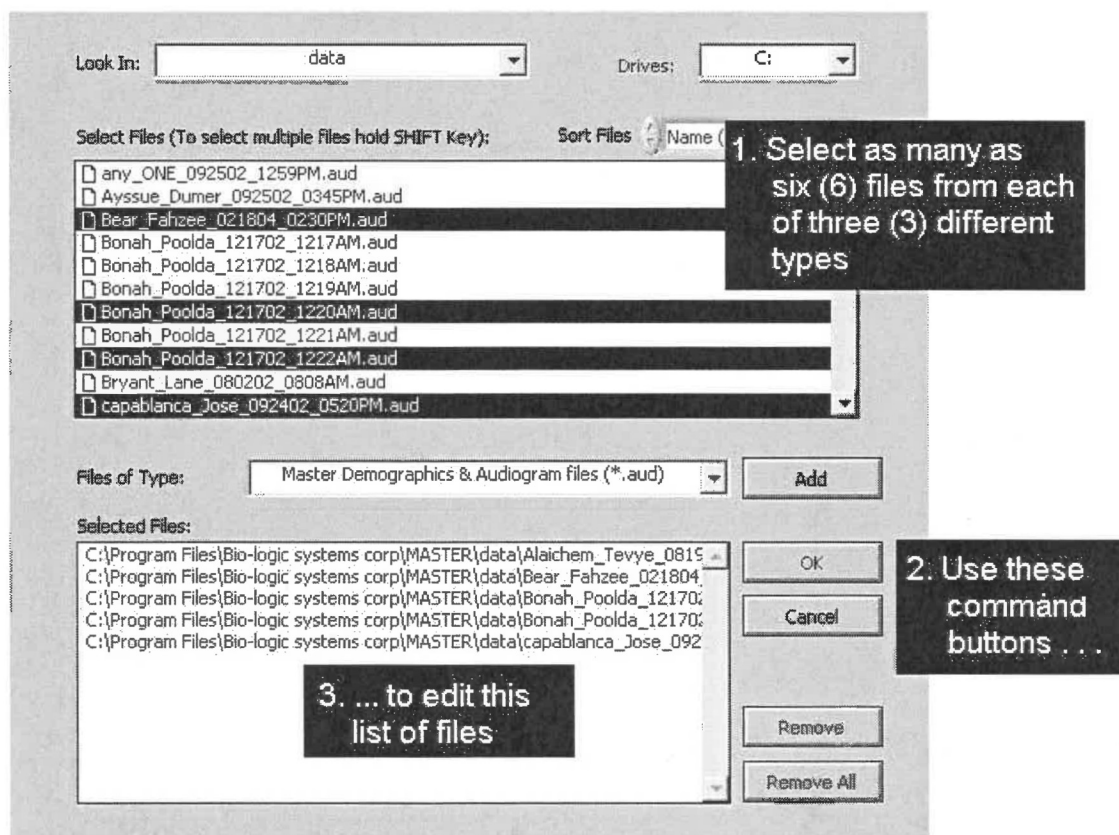
**Name (Ascending):** This sort order lists the files according to patient name. Names appear in alphabetical order from A to Z.

**Name (Descending):** This sort order lists the files according to patient name. Names appear in reverse alphabetical order from Z to A.

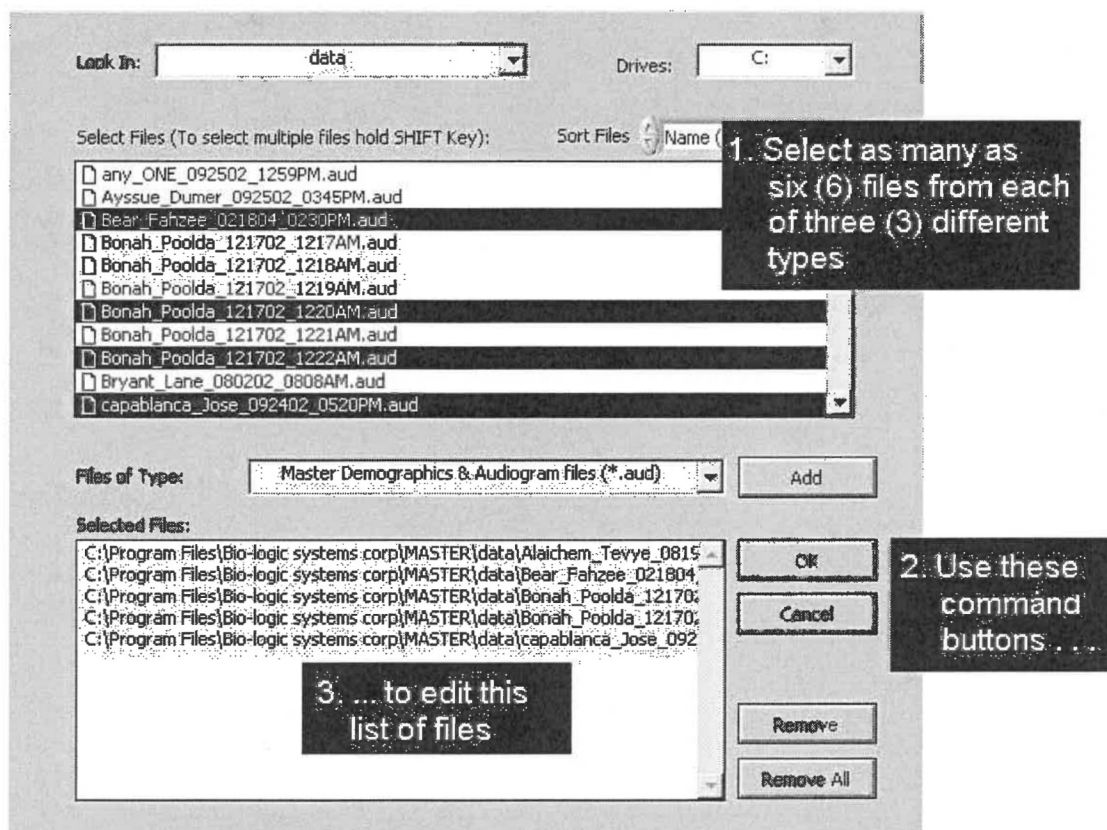
**Date (Ascending):** This sort order lists the files according to the date when the test was run. Files appear chronologically from oldest to most recent.

**Date (Descending):** This sort order lists the files according to the date when the test was run. Files appear in reverse chronological order from most recent to oldest.

8. Stop at the sort possibility that you want to use.  
The list of files in the Select Files field appears according to the sort possibility you have chosen.



9. Press and hold down the computer's SHIFT key and click on as many as six (6) different files from each of the three (3) different file types (air conduction, bone conduction, and sound field).
10. Select (click on) the Add command button to move the files you selected into the Selected Files field on the Multiple File Access dialog box.



**Note:** You can also add files to the “Selected Files” list by double-clicking files in the “Select Files” list. Remember: your maximum is six (6) diferenet files from three (3) different file types.

11. Select (click on) any file(s) in the Selected Files area.  
This highlights the file(s).

12. Click on the Remove command button.  
This erases the file from the Selected Files list.

**OR**

13. Click on the Remove All command button.  
This erases all files from the Selected Files list. Once you have finished editing the list of files:



[illegible]

14. Click on OK.  
This closes the Multiple File Access dialog box and launches the Multiple File Statistics tab set.

**OR**

15. Click on Cancel.  
This closes the Multiple File Access dialog box without accessing multiple files.



## How to use the Multiple File Statistics tab sets

The screenshot shows the software interface for Multiple File Statistics. It features a top navigation bar with tabs for 'Air Conduction', 'Bone Conduction', and 'Sound Field Speakers'. Below this is a row of test tabs labeled 'Test 1' through 'Test 6'. The main area contains several data tables. Callout 1 points to the test tabs. Callout 2 points to radio buttons for 'Use Correction', 'Ignore Correction', 'Better than...', and 'Worse than...'. Callout 3 points to a table of readings. Callout 4 points to a table for placing HL values. Callout 5 points to a table for typing the HL Threshold Level. Callout 6 points to a 'Generate selected graphs' button.

1. Click on any of these tabs to display its results

2. Click on one of these radio buttons

3. Click on one of these readings . . .

4. . . . to place its HL value (with or without correction) in the related field in this table

5. Type the HL Threshold Level that you want to use for each frequency

6. Click here to generate a multi-file audiogram

This set of tabs lets you see the statistics for as many as six (6) tests for each of the three (3) file types. To launch and use this screen:

1. Start the MASTER program.  
See [Starting the MASTER program](#).
2. Select (click on) the Multiple File Access command button.  
The Multiple File Access dialog box appears.
3. Follow the steps in the How to use the Multiple File Access dialog box section of this document.
4. Select (click on) one of the file type tabs.  
This brings the tab you want to the "top" of the stack. These tabs are the Air Conduction, Bone Conduction, and Sound Field Speakers tabs.
5. Select (click on) one of the test file tabs.  
This brings the tab you want to the "top" of the stack. These tabs are numbered Test 1 through Test 6.

## ADDITIONAL OPERATING PROCEDURES

2. Click on one of these radio buttons

3. Click on one of these readings ...

4. ... to place its HL value (with or without correction) in the related field in this table

5. Type the HL Threshold Level that you want to use for each frequency

6. Click here to generate a multi-file audiogram

Click on any these tabs to display its results

Test 1 Test 2 Test 3 Test 4 Test 5 Test 6

Test Date: 9/24/2002 Last Name: copeland

|           | 500 | 750 | 1000 | 1500 | 2000 | 3000 | 4000 | 6000 | 8000 |
|-----------|-----|-----|------|------|------|------|------|------|------|
| Left Ear  |     |     | 50   |      |      |      | 40   |      |      |
| Right Ear | 20  |     | 40   |      | 60   |      |      | 80   |      |

6. Select (click on) one of the radio correction buttons.  
Use these buttons to add a correction to the trace on the audiogram. You can select these corrections according to the transducer you use.
7. Select (click on) a reading in one of the cells in the Left or Right Ear Frequencies tables.  
The HL for the reading you choose appears automatically in the related cell in the Hearing Threshold Table.

**OR**

8. Click on one of the cells in the Hearing Threshold Table.  
These cells are for entry of the hearing threshold level of the frequencies for the left or right ear.  
Clicking in any of them places a text cursor in the cell.

**AND**

9. Type in the hearing threshold level you want to assign to the related frequency based on F-statistical data in the tables above. Apply additional corrections as you see fit.
10. Repeat these steps for other Test tabs and other File Type tabs.
11. Select (click on) the Generate selected graphs command button.  
This closes the Multiple File Statistics tab sets and generates a multiple File Audiogram screen.

**OR**

12. Select (click on) the Exit command button.  
This closes the Multiple File Statistics tab sets and returns you to the MASTER main screen.

## How to use the Multiple File Audiogram

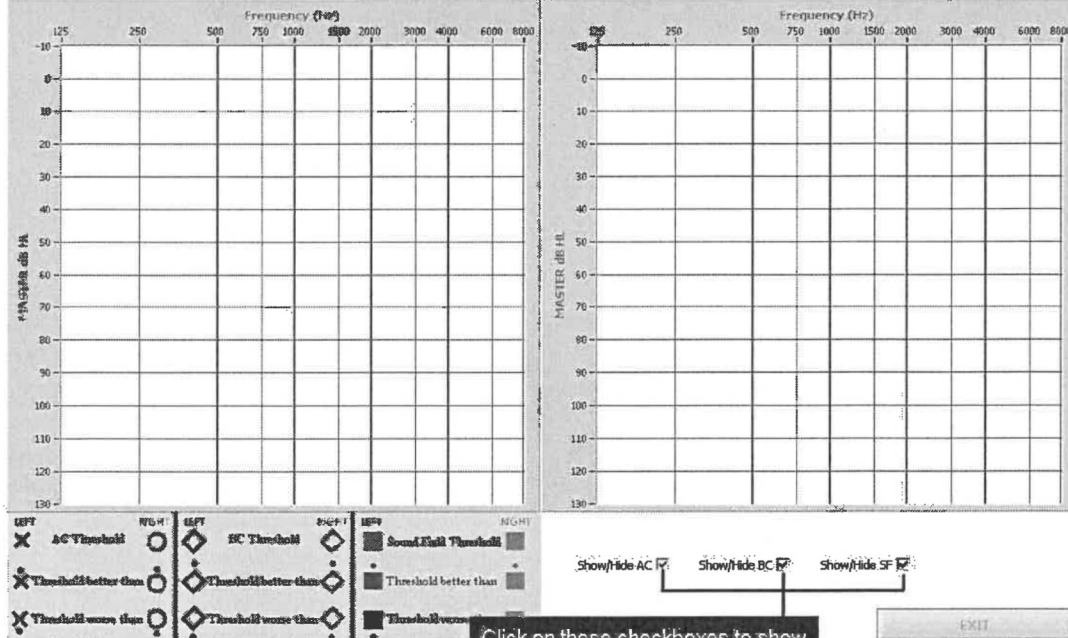
### Physiological Audiogram:

The files selected do not represent the same subject. Names will not be displayed.

PRINT AUDIOGRAM

Left Ear Audiogram

Right Ear Audiogram



Click on these checkboxes to show (checkmark) or hide (no checkmark) audiogram results for files of the respective type.

The MASTER system lets you generate and print audiograms from multiple test files. Follow these steps:

1. Follow the steps in the How to use the Multiple File Access dialog box and the How to use the Multiple File Statistics tab sets section of this document.
2. Select (click on) the Show/Hide checkboxes:

- Until a checkmark appears to display the related data type.
- Until no checkmark appears to hide the related data type.

Data types include:

- Show/Hide AC (air conduction)
- Show/Hide BC (bone conduction)
- Show/Hide SF (sound frequency)



**Physiological Audiogram:**

The files selected do not represent the same patient. Names will not be displayed!

PRINT AUDIOGRAM

Left Ear Audiogram

Right Ear Audiogram

Frequency (Hz)

125 250 500 750 1000 1500 2000 3000 4000 6000 8000

MASTER dB HL

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

LEFT RIGHT LEFT RIGHT LEFT RIGHT

AC Threshold BC Threshold Sound Field Threshold

Threshold better than Threshold better than Threshold better than

Threshold worse than Threshold worse than Threshold worse than

Show/Hide AC Show/Hide BC Show/Hide SF

EXIT

Click on these checkboxes to show (checkmark) or hide (no checkmark) audiogram results for files of the respective type

3. Select (click on) the Print Audiogram button.  
This sends the Audiograms to your system's output device.

**Note:** Currently, the MASTER system neither saves multiple file audiograms, nor does it print the statistics tables that you used to create the audiogram. These features are under development.

OR

4. Select (click on) the Exit command button.  
This closes the Audiogram for Patient screen without printing the data and re-launches the MASTER Menu screen.



## Appendix A

### *Precautions and Safety Instructions*



#### **WARNING**

Equipment that supports this program must be designed to meet all applicable medical equipment standards for patient isolation and electrical safety. Bio-logic Systems Corp assumes no responsibility for the equipment into which this program is installed, or for errors and omissions made during the installation process. It is the installer's responsibility to insure the finished system meets appropriate equipment standards, such as IEC 60601, BS 5724, and UL2601.



#### **WARNING**

Never place powered equipment (that is, equipment that operates with a electric power source) on any flammable surface. Avoid this whether the equipment is active or not.



#### **IMPORTANT**

This device is intended for use by qualified personnel only. Please read this section and the rest of the MASTER System's User's and Service Manual before installing any of the MASTER System hardware, then retain this section as a reference while operating, transporting, storing or re-installing the MASTER System equipment.

## ***Equipment Identification Label and Markings***

### **Classification**

The International Electrotechnical Commission classifies electro-medical equipment according to its power source (external or internal) and the degree of protection it provided against shock. The MASTER System is classified as Class II, Type BF, which means it qualifies as externally powered equipment capable of protecting a patient from electrical shock, provided electrical parts, such as electrodes, have been applied to the patient.

### **Warning Labels and Symbols**

Symbols are often used on equipment in preference to words in order to simplify language differences and to provide instant comprehension of warnings and markings in a restricted space. The following symbols appear on MASTER System equipment or in the MASTER System User's Manual.



Attention, consult accompanying documents



Type BF equipment

## ***Electrical Installation Requirements***

All system equipment must be installed at a properly grounded site. This section gives detailed information on how to ensure the installation site meets all necessary requirements.

### ***Grounding Requirements***

The desired installation site must have a grounding wire for electrically connecting the system equipment to a properly grounded terminal (Earth). The grounded terminal shall be connected to the steel skeleton or under the main reinforcing steel with any multiple grounding wires grounded at the same point. (One point grounding.) The shield room or bed must also be grounded at the same grounding terminal as the installation site.

## ***Power Plug Requirements***

Use only the following power plug configurations.

- A 3-pin power plug requires a 3-pin wall socket with a properly installed grounding pole. Verify the wall receptacle is correctly grounded before inserting the 3-pin power plug.
- A 2-pin/3-pin adapter for connecting 3-pin power supply plugs into a 2-pin wall socket. The grounding terminal on the adapter must be fixed with the free end secured to the ground terminal.
- A 2-pin power plug with a grounding terminal for a 2-pin wall socket. The grounding terminal on the power plug must be secured to the ground terminal.

## ***Types of Hospital Facility Groundings***

Use the following information to verify the installation site has the appropriate grounding.

|                      |                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------|
| Grounding Resistance | The ground resistance of grounding poles connected to medical equipment must be 10 ohms or less.       |
| Protective Grounding | Protective grounding must be provided for patient safety to let the leak current flow into the ground. |
| Functional Grounding | This type of grounding is not a requirement for patient safety, but will help to eliminate hums.       |

## ***Hazards of Improper Electrical Installations***

Improper electrical installations can cause electrical shock to either the patient or user. It can also damage system equipment under a fault condition. Ensure patient electrodes do NOT come into contact with any conductive material, including the grounded chassis of the computer.

# Environmental Specifications

## ***Temperature***

Operating: 15 to 40° C

Storage and transportation: -20 to 70° C

## ***Humidity***

Operating: 15% to 95% at 40° C non-condensing

Storage and transportation: 90% at 65° C

**Note:** These are maximums. They are not "normal" operating or storage conditions.

## ***Condensation***

Recovery Time after condensation to operations specifications: 24 hours

## ***Flammability***

UL94 HB

UL94V-O

## ***EMC Specifications***

Radiated Emissions: CISPR 11/EN55011: 1991 Group 1 Class B

Conducted Emissions: CISPR 11/EN55011: 1991 Group 1 Class B

Electrostatic Discharge Immunity: IEC 801-2: 1991

Radiated RF Immunity: IEC 801-3: 1991

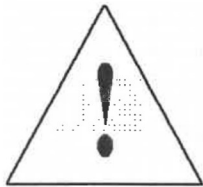
Fast Transient / Burst Immunity: IEC 801-4: 1988

Surge Immunity: IEC 801-5



## Installation Precautions

Use the following precautions when installing or re-installing MASTER System equipment.



### WARNING

Never turn power on or off with a patient connected to the system. Only qualified personnel should use this device. Please read this section before installing any of the hardware. Refer to this section when you operate, transport, store, or re-install the system.



### WARNING

Make sure that any platform, table, cart, or other surface used during the operation, transport, or temporary or permanent storage of the system and its components is adequate, sturdy, and safe. Bio-logic Systems Corp. is not responsible for any injury or damage that may result from inadequate, poorly constructed, or unapproved transports, carts, operating surfaces.



### WARNING

Never use equipment that has parts missing or equipment that might contain loose parts inside of it (that is, inside an enclosed portion of the equipment). If you suspect a piece of equipment has missing or loose parts, make contact with Bio-logic System Corp.



### WARNING

Never place powered equipment (that is, equipment that operates with a electric power source) on any flammable surface. Avoid this whether the equipment is active or not.

**WARNING**

Make sure that your system is plugged into the Bio-logic Systems Corp Isolation transformer or runs on battery power **BEFORE** you use the computer in a patient environment.

***Environmental Conditions***

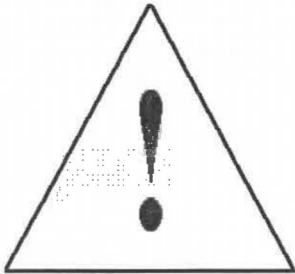
- Select a room with properly grounded power sources.
- Do not use or store MASTER systems and equipment in places where chemicals are stored or where there is a potential for gas leakage.
- Avoid moisture or contact with water, extreme atmospheric pressure, excessive humidity and temperature, poorly ventilated areas and dusty, saline or sulfuric air.
- Verify the selected site maintains a relative humidity between 25% and 95% (without condensation).
- Verify all conditions meet the requirements listed in the Environmental Specifications section of this manual.

***Room Topography***

- Place all equipment on an even, level surface. Avoid the potential for mechanical shock or possible vibrations during setup system operation or when relocating the equipment.
- Verify the iso-transformer and all portable multiple socket-outlets are off the floor and in a dry location.

## Installing the MASTER system

See the [Installing the Master](#) section of this document.

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>CAUTION</b></p> <p>This system is intended for use as a medical instrument only. The software installed on this system has been verified and validated for that use, as long as no other unintended or unauthorized software is running at the same time. Do not install, download, save, or transfer other programs, software, or data on this equipment without first consulting Bio-logic Systems Corp. Doing so may interfere with the proper operation of this software.</p> |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Software Installation

See the [Software Installation](#) section of this document.

**Note:** Bio-logic Systems Corp. is not responsible for resolving incompatibilities between the kit and a computer that does not meet the minimum computer specifications.

### Hardware Installation

See the [Hardware Installation](#) section of this document.



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;"><b>WARNING</b></p> <p>Each of the colored plastic housings on the cables also displays arrows that identify the top of the connector. This indicator helps align the cable connector male plug to the female jack on the side of the MASTER system module. Careful alignment of the cable plug to the jack is important to reduce the chance of bending the metal pins inside the male connector. You must insert the plugs completely into the corresponding jacks for the system to operate properly. Never twist these connectors during insertion or removal. Twisting the connector in the socket may damage the metal pins and cause communication problems between the MASTER system module and the computer. It may also cause other system malfunctions involving stimulus delivery or MASTER system recording.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## System Hookups



### WARNING

Only use the Power Supply Model Number 520-PS12D3 or 520-PS6V4A (depending on NAVPRO model) with the MASTER system.

- Verify the system computer power supply (if present) is plugged into either:  
—an iso-transformer from the 520-XFS family of Iso-transformers

#### OR

- a 520-AMPS01 iso-transformer.
- Verify the maximum load for any multiple portable socket-outlet:  
—does not exceed 750 VA for the 520-XFS family of Iso-transformers  
—does not exceed 100 VA for the 520-AMPS01
- Do NOT use the multiple socket-outlets to power any equipment that isn't a part of the MASTER System. (Adding other equipment may increase the current amount of leakage and exceed the safety limit.)
- Do not interconnect multiple pieces of equipment without verifying that the sum of all leakage currents does not exceed the safety limit.
- Do not connect non-medical electrical equipment directly to a wall outlet if the MASTER System is using a multiple, portable socket-outlet with a separating iso-transformer. (The additional equipment may increase the current amount of leakage and exceed the safety limit.)
- Do not connect equipment, which can potentially provide electromagnetic or other types of interference. This may cause the MASTER System equipment to function incorrectly.
- Verify the equipment is connected to a power line source with the following frequency, voltage and current capacity.

|                   |               |
|-------------------|---------------|
| Frequency:        | 50 / 60 Hz    |
| Voltage:          | 100 – 240 VAC |
| Current Capacity: | 15 Amps min.  |

- Use only Ink Jet printers for MASTER System setups that use the MASTER System isolation transformer.



### ***Installation Verification***

Use the following to verify all equipment is correctly installed before use.

- Verify all equipment and cables are undamaged and in good working condition.
- Verify all equipment and cables are connected according to the instructions in this manual.
- Verify unauthorized equipment is not connected to the system.
- Verify the equipment is properly grounded.
- Verify all circuitry with a direct connection to the patient has been checked twice.
- Verify all system or equipment batteries show the correct voltage and are in perfect working condition.

### ***System Diagnostic and Verification Tests***

Before connecting the patient to the system equipment, perform all required system diagnostic tests described in the MASTER System User's and Service Manuals. All tests must pass.

## Precautions During System Operation



### WARNING

Never turn power on or off with a patient connected to the system. Only qualified personnel should use this device. Please read this section before installing any of the hardware. Refer to this section when you operate, transport, store, or re-install the system.



### WARNING

All of the disposable supplies from Bio-logic Systems Corp. that are coupled to the scalp are latex-free and comprised of hypoallergenic material. Bio-logic is not responsible for disposable items purchased from another vendor. Carefully read and follow the proper use instructions that accompany any disposable items.



### WARNING

Make sure that any platform, table, cart, or other surface used during the operation, transport, or temporary or permanent storage of the system and its components is adequate, sturdy, and safe. Bio-logic Systems Corp. is not responsible for any injury or damage that may result from inadequate, poorly constructed, or unapproved transports, carts, operating surfaces.

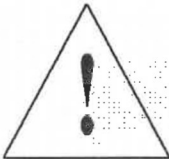


### WARNING

Never use equipment that has parts missing or equipment that might contain loose parts inside of it (that is, inside an enclosed portion of the equipment). If you suspect a piece of equipment has missing or loose parts, make contact with Bio-logic System Corp.

**WARNING**

Never place powered equipment (that is, equipment that operates with a electric power source) on any flammable surface. Avoid this whether the equipment is active or not.

**WARNING**

This equipment is not protected from a cardiac defibrillator discharge. Using a defibrillator while a patient is connected to the system equipment may permanently damage the equipment.

1. Follow all safety procedures, giving careful and constant attention to the patient and system equipment.
2. Follow hospital procedures to validate all electrodes are properly applied in order to prevent patient burns while using electro-surgical equipment.
3. Turn the system power on BEFORE you attach electrodes to the patient. Remove the electrodes from the patient BEFORE you turn the system power off. This avoids shock hazards from power surges.
4. Attach electrodes to the patient and the system hardware so that the electrode cables can neither entangle nor strangle the patient.
5. Avoid direct contact between the patient and system equipment at all times.
6. Do not add other equipment that is not protected against ingress of liquids.
7. This equipment is not suitable for use in areas of flammable or anesthetic mixture.

***Signal Output and Input***

The system computer must NOT be used in a patient environment unless one of the following conditions is met:

1. The system computer and all other peripheral devices are plugged into the isolation transformer.
2. The portable computer is powered by batteries. It does not plug into a wall outlet. No AC-powered peripherals except the MASTER System module (NAVPRO) connect to the portable computer.
3. The system computer has an isolated power supply.

***Care and Maintenance***

This section gives users information on maintaining and caring for MASTER System.

## ***Cleaning***

No special cleaning is required for this device. Ordinary, 'house-keeping' type cleaning to prevent the accumulation of dust or debris is adequate.

## ***Inspection***

No special inspection procedures are required for this device.

## ***Disassembly and Storage***

The MASTER System equipment requires careful handling during disassembly and storage.

1. Return all controls to their original positions and turn OFF all system equipment.
2. Carefully remove all connecting cables without using force.
3. Follow designated hospital procedures to clean MASTER System equipment.

## ***Maintenance***

MASTER System equipment requires professional maintenance and repair service. Never attempt to alter, modify or repair this equipment alone.

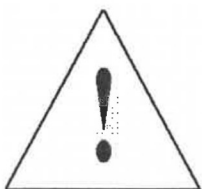
1. If the MASTER System equipment is not functioning correctly, mark all defective parts clearly to prevent accidental use before the appropriate repairs can be made.
2. When using a defibrillator, either protect the equipment against defibrillator discharge or remove all patient cables and/or transducers to avoid system damage.



## Appendix B

### Electrical Requirements

Use the following requirements to avoid noise interference while recording activity from patients and to ensure a consistent electrical environment for the computer system.



#### WARNING

Never turn power on or off with a patient connected to the system. Only qualified personnel should use this device. Please read this section before installing any of the hardware. Refer to this section when you operate, transport, store, or re-install the system.



#### WARNING

Never place powered equipment (that is, equipment that operates with a electric power source) on any flammable surface. Avoid this whether the equipment is active or not.

### Isolated or non-isolated power

Although MASTER Systems will function with non-isolated power, Bio-logic prefers isolated power for maximum efficiency and safety.

### 15 or 20 amps

Although 15 amps is acceptable in smaller systems, a 20-amp service is preferable any time the system in use has a large amount of features.

### BTU Offset

Bio-logic Systems Corp. computer systems release a maximum of 2000 BTU per hour.

### Magnetic Field

Bio-logic computer systems should operate without any interference in a magnetic field of 0.05 Gauss.

### Room Shielding

Although Bio-logic recommends room shielding, it is not absolutely required. Users may elect to shield the room if the location is close to noise-generating equipment and should provide shielding if there are potential noise level problems.

### **Fluorescent Lights**

Although the MASTER System works in a room with fluorescent lighting, incandescent lighting is preferred. Also, dimmer switches can produce noise interference unless the switch is set at a full position.

### **Thickness of the Conduit**

The thickness of the conduit and all electrical installations must meet the National Electrical Code and applicable local codes.

## Appendix C

### Suggestions for Optimal Test Procedure

Begin the test using the default protocol. Consider enabling exponential modulation. It may improve response amplitude at the high and low frequencies and reduce the test time to reach a significant response.

The default Master protocol sets the intensity range to begin at 60 dB HL and to end at 30 dB HL. Since a patient's Master threshold is typically 10 dB higher than the behavioral threshold (depending on length of averaging, etc), terminating with a significant response on Master at 30 dB means that the behavioral threshold at the carrier frequency is probably 20 dB HL or better, confirming normal sensitivity. If you feel that the management of the child would be the same whether their true behavioral response is 20 dB or a lower threshold, then it is not necessary to continue testing to lower intensity levels.

Although the default is set to a maximum of 32 sweeps, it is not necessary to collect the maximum in all cases. In fact, for high intensity stimulation, it may be inadvisable to continue averaging to 32 sweeps due to the possibility of damaging hearing from prolonged high level stimulation. Look at the following information to make a decision about how long to continue to collect data at each intensity.

Are all of the F-values at or below 0.050 and have they been "green" for at least 2-3 consecutive sweeps? If so, Accept Results to begin collection at the next lower intensity level. (At moderate intensities for a quiet patient this can occur in as few as 5-6 sweeps.)

If the F-values for all frequencies are significant and the amplitude of the response is quite large in a small number of sweeps, you may want to consider changing the dB Step control on the collection window to 20 before selecting the Accept Results button to decrease intensity by more than the default 10 dB step. In other words, you might want to jump from 60 dB HL to 40 dB and skip 50 dB.

Are the F-values consistently at or below 0.050 at 3 out of 4 frequencies in each ear but one frequency in one or both ears has not reached significance? Rather than continuing to collect data at that intensity for many more sweeps, your time may be better used to move on to the next lower intensity and collect more sweeps at that intensity. In general, as the stimulus level gets closer to threshold, you will have to average longer to achieve a significant response.

It is probably most efficient to proceed with testing lower intensities in sequence (down to 30 dB HL) as long as at least one of the test frequencies continues to achieve a significant response. However, if a significant response was not achieved at the higher intensity for some frequency despite sufficient averaging, you should not expect or wait for a response to appear at the lower intensity for that frequency.

Once you have tested down to 30 dB HL, then begin to search for responses at frequencies where no response was achieved at 60 dB HL. Do this by selecting the Change Intensity button before the 32<sup>nd</sup> sweep is collected at 30 dB. Change the intensity to 80 dB HL. The highest intensity at which you can present multiple stimuli in an ear is 80 dB HL. In general, if the patient is quiet, significant responses should appear within 8-10 sweeps at these high intensities if the intensity is above the person's threshold.

If no response is achieved at 80 dB for some frequencies, you will need to proceed to testing of individual frequencies. The program will not permit stimulation with multiple stimuli in an ear with intensities above 80 dB due to the risks associated with high level stimulation. But when testing above 80dB, you can still test both ears simultaneously and select the same or different frequencies for each ear.

## APPENDIXES

Prolonged presentation of very high intensity stimuli for which you received a “high intensity warning” message can damage hearing. Limit exposure to these loud stimuli. Because many cochlear hearing losses have recruitment, the response at intensities above threshold often become significant quickly without prolonged data collection.

Here is some information you can view on the collection screen to get a sense of whether a response may eventually occur:

- Is the noise level continuing to go down or has it stabilized?
- From sweep to sweep, is the amplitude of the response changing or does it seem to be staying about the same?
- Is the F-value very high despite a fairly high number of sweeps (for example, above 0.400)?
- Is the F-value getting smaller from sweep to sweep or is it staying about the same?
- Is the noise estimate below 10 nV?



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